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HOW SECONDARY MODERN SCHOOL CHILDREN SPEND THEIR TIME

by W. CURR, H. J. HALLWORTH and A. M. WILKINSON
Lecturers in Education, University of Birmingham

During the last few years there have been innumerable surveys of the habits, abilities, interests and attitudes of children and adolescents—what they read, how they spend their pocket money, how much time they spend watching television, their attitudes to authority and to punishment, their ambitions and vocational aspirations. These studies have produced useful and interesting information, which has sometimes been related to attainments, intelligence, social class, etc. Yet they have usually been carried out on a geographically restricted sample, and almost always on a once-for-all basis. When such studies are repeated in another place at another time, there is no means of accounting for any discrepancies that arise. Was the original investigation invalid? Do habits and leisure occupations vary significantly from place to place? Has the lapse of time produced a change in fashion? It has been suggested that trends in behaviour and attitude move across the country from South-East to North-West (for example habits of speech and language), that they pass down the age scale from older to younger children, (as in the case of games and "crazes" like the hula-hoop, and addiction to television), or that they spread out from urban to rural areas. On the other hand, mass communications may produce a conformity which overrides local traditions and culture patterns. Are children at the mercy of commercial or alien influences? Do these influences affect their attitudes, fears, anxieties?—their response to authority?—their self-image?

The writers believe that there is still a lack of adequate information, drawn from a sufficiently large population, and sufficiently frequently revised, about the habits, interests, activities and attitudes of children, to provide an answer to these questions. Two major difficulties have delayed the collection of such information—the need for a large and widespread network of suitably-qualified persons to collect it and the enormously laborious task of collating and analysing it. At Birmingham University these two difficulties have recently greatly diminished. For fifteen years, a number of degree and diploma courses have been offered to experienced teachers. There is now a large number of ex-students of these courses scattered through schools, teacher-training colleges and other educational services throughout the United Kingdom (and indeed in several countries overseas), and they constantly demand opportunities for co-operative research. Also, during the last few years, the department has been increasingly applying in its educational research the techniques of punched-card sorting and electronic computation, and is now in a position to record and analyse large quantities of data.

With these opportunities available, the writers recently decided to initiate a project they had long wished to undertake, namely, a survey of the distribution, throughout the country, of children's habits, leisure activities, interests and attitudes (with special reference to the influence of mass media), and of the fluctuation in these variables over a period of several years. This investigation, code-named BUSCH (Birmingham University Survey of Children's Habits) was begun in autumn 1961 with a preliminary pilot run in a five-form entry secondary modern school in the inner ring of Birmingham, where all the boys and girls in the first and fourth forms of each of the four years completed a detailed diary for three days (a Wednesday, a Saturday and a Sunday), a questionnaire on their use of pocket money, and two tests of attitudes to authority. After eliminating sets of scripts which were incomplete owing to absences, the net sample was approximately two hundred.

The main purpose of this preliminary survey was the perfecting of techniques and, in particular, the development of a system for coding the occupations recorded in the diary-forms. The present article is concerned only with the latter aspect, and with the distribution of activities, by age and by sex, in this first sample of secondary modern school children.

The diary form consisted of a double-sided foolscap sheet showing every quarter-hour from 7 a.m. till 10.30 p.m., with space to enter "all the things I did" "with whom" and "where". These forms were given to the children by experienced teachers (not known to them) who were taking an advanced course in psychology or education at the University. Pupils were told on a Tuesday that they would be asked on Thursday to fill in a form recording all they had done on Wednesday; this was completed in school on Thursday. The diary forms for Saturday and Sunday were identical to that for Wednesday, but these were taken home (on the week-end following

BUSCH DIARY FORM

Code No...................

Diary for ....day

TIME	ALL THE THINGS I DID	WITH WHOM	WHERE
7.0 to 7.15 a.m.			
7.15 to 7.30 a.m.			
7.30 to 7.45 a.m.			
7.45 to 8 a.m.			
8 to 8.15 a.m.			

And so on until 10.30 *p.m.*

the "Wednesday" record), and time was also allowed to complete them if necessary on Monday morning in school. Standard instructions were read out to the children in each class. As accurate a record as possible was asked for—not just "played" but the game played—not just "read" but the book read—not "with Tommy" but "with my brother", "with the boy next door", etc. Strict secrecy was promised, and was guaranteed by having the children place their own diary forms in a large envelope which was then sealed in their presence. They were asked not to put their names but were instead given code numbers to record on their diaries.

Coding of Activities

Diary entries were grouped in ten main categories (with sub-divisions), numerically identified for the purpose of machine computation (see Appendix). The categories were in the main those which have been found satisfactory by investigations such as Smalley (1) who used "Routine, Physical, Social, Hobbies, Literate and Passive", though our sub-divisions are not always the same as his. An innovation was the use of double classification. Many categories are not mutually exclusive; singing in the bath is both musical and routine. Not all such double-occupations were coded, but provision was made for recording the activities that were thought most likely to occur with others, namely, smoking, drinking, courting, listening to radio, listening to records, watching television.

Objectivity of classification was verified by having some of the more difficult entries independently coded by a group of teachers taking advanced courses; there were few differences of opinion regarding identification of occupations. Some of the entries were quaint, puzzling or plaintive—"sat down nothing to do", "breaking ice over friend's head", "singing carols on step", "went to aunt's" (followed by 30 entries of "same"; was this a seven and a half hour journey?), "break, we never had no play", and (11.30 till 1.15) "sat down"! Discussion with the teachers who administered the diary showed that the time-range may require modification—7 a.m. was unnecessarily early for some, and 10.30 p.m. was not, for every child, the end of the day. Some suspicion of the anonymity precautions was reported, though most of the pupils seemed satisfied with this. The numerically-coded entries were transferred to punched paper-tape, and were then sorted by electronic computer (2). For each of the three days and for each of the eight sub-groups (boys and girls at each of four age-levels) means were calculated for time of getting up, time of going to bed and time spent in each coded category of activity.

RESULTS

While the main object of this study is the comparison of habits in different parts of the country and the detection of trends over the years, it is of some interest to note the facts as stated by this one group of children in a secondary modern school. Even in the most factual and impersonal matters, we are surprisingly ignorant of the ways of children in general. How many readers of this article could say (without reading further) at what time 12- to 15-year-olds get up and go to bed?—on a school-day?—on a Saturday or Sunday? On what do they spend most of their free time?—How long do boys and girls spend on household chores?—or in watching TV? This November survey in a Birmingham school shows that both sexes and all ages get up at about the same time—about 20 to 8 on weekdays. On Saturday, they stay on the average an hour and a half later in bed, rising between 9 and 9.20—except, surprisingly, the second-year boys, who are up at 20 to 9. Sunday rising varies widely, the *average* for third-year girls being as late as 10.27! Bedtime on the week-night ranges from 9.30 for the 12-year-olds to 10.15 for 15-year-olds. On Saturdays and Sundays they stay up slightly later but not appreciably, which is surprising. Has TV produced a tendency to stay up just as late on school-days as at week-ends?

Next to school the chief occupation of the waking hours on weekdays is watching TV—for every group except the first-year girls.

Average watching-time is upwards of one and a half hours, usually two hours or more. At week-ends apart from time spent in bed, all eight groups spend more time watching TV than doing anything else—an average of two and a half hours on Saturdays (nearly three for first-year boys) and three to three and a quarter hours on Sunday (except second-year girls, whose Sunday-viewing average is two and a half hours). What *did* previous generations do with this time? Were these thirteen hours or so in a week better spent by the pre-TV child, or did he "sit down, nothing to do"? (A BUSCH Survey carried out twenty years ago could have given the answer.) How much of this time will have been weaned away from TV five or ten or twenty years hence?—by local broadcasting, for example.

On week-days the boys and girls spend most of their non-TV waking time on walking and talking with their peers; on Saturdays, boys spend most of their non-TV time with peers, but girls on routine activities. The next highest Saturday activity for boys is paid work, and for girls household chores. Girls do twice as many chores as boys. On Saturday, for instance, fourth-year girls do an average of one hour forty minutes compared to some twenty-five minutes by boys. On Saturdays, girls of all ages do well over an hour, increasing with age; no class of boys has an average anywhere near that. On Sundays most girls work even harder; third- and fourth-year girls do one and a half hours approximately, but third- and fourth-year boys do even less on Sunday than on Saturday.

Hobbies average only a minute or two, books little more, though the younger children read for about fifteen minutes on Saturday (often in bed). Games—official or otherwise—on Saturday, figure but little in the records. The most active groups were Form I boys (nearly an hour) and Form II girls (about half an hour). Time so spent decreases with age, until fourth-year boys average twelve minutes, and fourth-year girls eight minutes. The routines of dressing, toilet and meals occupy girls about one and half hours on week-days, boys a little less. On Saturdays, the girls give more time to this, some groups as much as two hours, but boys on the whole spend less—third-year boys, less than half an hour! Perhaps boys eliminate washing, and gobble meals!

"VICES"

Some of the interesting entries refer to the "vices" of smoking, drinking, courting. These activities are indulged in by so few that the total time, when averaged over a class of children, reads a little oddly, and frequencies (i.e. *number* of children indulging) would be more realistic. Drinking is admitted to only by a few third-year girls (e.g. "drank stout with my mum") and fourth-year boys. Smoking is recorded by both sexes in the third and fourth years, but less often than one might have anticipated, and almost entirely on school-days and *at school*; Sunday shows hardly any at all—a reflection perhaps of social pressure on the one hand, and parental disapproval on the other. Association with the opposite sex is reported at all ages, and, for the fourth year, it ranges from "talking in playground" and "walking home" for about a total of half an hour on Wednesdays, to an hour on Sundays with the boy or girl friend, and on Saturdays, two hours spent by the boys with the girls, but only three-quarters of an hour spent by the girls with the boys. This apparent mystery is perhaps partly explained by the fact that the younger girls go out with older boys, so that it is not on a par with the Terman-Merrill absurdity "more men than women were married last year".

RELIGION

After the three deadly vices, a word about virtue: among boys and girls at all stages there is some church attendance—about ten minutes, when averaged out, except for second-year girls, who claim over twice as much. It will be recalled that this is the group least addicted to Sunday TV, but even for them, TV claims six times as large a slice of Sunday as the church. The girls on the whole claim more churchgoing than the boys.

CONCLUSIONS

The specimen statistics quoted here raise many interesting speculations: Does the school situation encourage smoking?—Has television standardised bedtimes?—Why do first-year girls stay up later than second-year girls?—How far has the emergence of "shopping" as an occupation been the result of commercial pressures?—What is the relation of TV watching to IQ?—to social background?—Do those who see most TV have different attitudes to authority? It is sometimes objected that questionnaire techniques such as the diary form used here are at the mercy of dishonesty on the part of the respondents, but it should be remembered that while deliberate social conformity may result in an underestimate of, say, smoking (or a boastful overestimate) the general effect of inaccuracy in records not subject to any systematic social bias would be to scatter the results at random. It is inconceivable for instance that any sort of conspiratorial telepathy could produce an almost unanimous report that all these children have an average Saturday bedtime between 9.30 and 10.15, or that they all get up around 20 to 8 on a week-day. Nor should it be forgotten that it is of interest when groups differ even if only in what they *want* us to believe of them. If adolescents are more willing to claim association with the opposite sex now than they were ten years ago—if boys in the secondary modern school are less willing to admit to doing household chores than grammar school boys of the same age—such differences, at the very least, reveal differences in self-image, and self-image is probably one of the most potent determinants of behaviour. A further possible objection to the technique adopted here is the fact that the diaries for Saturday and Sunday were taken home. This was found necessary because of the difficulty of remembering the week-end doings on Monday morning; it is possible that awareness of potential parental disapproval may have affected the entries for these two days.

The results obtained from this experimental survey are sufficiently interesting to justify further study, but their chief value will be in the comparisons to be made between town and country, South and North, England and Wales and Scotland, grammar school and independent school and secondary modern school. For the second stage of the research, which is now in progress, we have Buschmen providing material from all these sources.

REFERENCES

1. Smalley, L. M., "A Practicable Diary Technique for Time Sampling the Everyday Life of Children". *Ed. Rev.*, 10, 3.
2. The sorting programme was written in Mercury Autocode and machine code by H. J. Hallworth.
3. It is interesting to compare these findings with those of Abrams ("What Children Watch", Granada TV, n.d.)—a survey of winter viewing by children aged five to fifteen in the early months of 1960. In each case the Birmingham children watch less; Abram's averages are: Week-days: 2.40 hours, Saturday: 4.14 hours, Sunday: 3.54 hours.
4. Smalley (op. cit., p. 242) and all the previous researches he quotes give a proportion of time spent in home duties by boys to that spent by girls as 4 : 6.

APPENDIX

BUSCH

CHILDREN'S DIARIES—CODING KEY

A. Categories of Occupation.

- 00 . . . *No entry*
- 10 . . . *Routine Activities*—general
    - 11 dressing, toilet, meals
    - 12 short journeys (e.g., to school)
    - 13 household chores and errands
    - 14 paid employment
    - 15 at school (in class)
- 20 . . . *Physical Activities*
    - 21 solitary (e.g., cycling alone)
    - 22 in company (e.g. playing "tig")
- 30 . . . *Social Activities*—general (including e.g., "doing nothing" with parents at home).
    - 31 talking or walking or playing non-active games with peers
    - 32 talking or walking or playing non-active games with adults
    - 33 shopping (or shop-gazing) with others
    - 34 in cafes
    - 35 at youth club or youth organisation
    - 36 at church
- 40 . . . *Hobbies*—general
    - 41 making things
    - 42 painting, or playing musical instruments
    - 43 looking after or playing with pets
- 50 . . . *Literate Activities*—general
    - 51 reading comics or daily papers
    - 52 reading books
    - 53 writing or doing homework
    - 54 at the library
- 60 . . . *Passive Occupations*—general
    - 61 watching television
    - 62 listening to radio
    - 63 at the cinema
    - 64 listening to gramophone records
    - 65 watching sport

70 . . . *Miscellaneous Occupations*—general (e.g., "drowsing in arm-chair", "counting money")

80 . . . *Entry defying interpretation* because vague, indecipherable, or incomprehensible

90 . . . *In bed*

91 got up
92 went to bed

Note: Where the occupation is stated *simply* as:

"with my boy-friend" . .	record 100
"with my girl-friend" . .	,, 100
"smoking"	,, 200
"having a glass of beer" .	,, 300

B. Prefixes

1. Where any of the above activities is carried out in the company of a friend of the *opposite sex*, prefix "1" to the entry.
2. Where any of the above occupations is accompanied by *smoking*, prefix "2" to the entry.
3. Where any of the above occupations is accompanied by *drinking* (alcoholic), prefix "3" to the entry.
4. Where any of the above occupations is accompanied by listening to *radio* at home, prefix "4" to the entry.
5. Where any of the above occupations is accompanied by watching *television* at home, prefix "5" to the entry.
6. Where any of the above occupations is accompanied by listening to *records* at home, prefix "6" to the entry.

TRENDS IN MUSIC TEACHING

by J. B. BROCKLEHURST

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The second of a series of articles which are appearing from time to time on trends in the teaching of various subjects

THE emergence of a new pattern of secondary education in the post-war years has been accompanied by a reassessment of aims and methods in teaching. This applies to music no less than to the other subjects of the curriculum and in recent years the scope of school music has been greatly enlarged as a result of the increasing awareness of the educative value of music and its importance in a truly liberal education.

MUSICIANSHIP

Much thought has been given to the most effective methods of laying the foundations of musicianship and, since we are concerned with the question of musical literacy, musical educationists have been guided to some extent by modern methods of teaching children to read and write. It is now recognised that the once popular musical theory lesson was of but limited value: the symbols of musical notation and other technical aspects of music were often introduced prematurely and were not sufficiently closely related to melodies and rhythmic patterns with which the children were already familiar. There is clearly much to be gained in the early stages of musicianship training from giving children opportunities to experiment with the raw materials of music and to discover things for themselves (Bailey, 1958). Thus, just as concrete should always precede abstract in learning and practice precede theory, so sound should always be introduced before symbol.

In developing children's rhythmic sense, the modern practice is to make use of the close associations which exist between music, speech and bodily movement; the playing of simple percussion instruments can help to develop a feeling for pulse, accent and pattern and the French rhythm names can be a valuable aid in the early stages.

Until quite recent years teachers relied almost entirely on the tonic solfa system for developing pitch sense. This method of aural training, with its aural mnemonics and the doctrine of the "mental effect" of the degrees of the scale, was devised by John Curwen in the mid-nineteenth century and has its roots in the hexachordal system of Guido d'Arezzo. Singing at sight from solfa notation formed the basis of elementary school music in this country following the 1882 Code, which introduced a grant of one shilling for every pupil who was taught the elements of notation. With the ending of the Revised Code, however, there inevitably followed a reaction against this form of musical training which had been too often regarded, not as a means to an end, but an end in itself. There has undoubtedly been some decline over the years in sight-singing proficiency in our schools and the more ardent tonic solfa-ists ascribe this entirely to the neglect of tonic solfa.

Most musical educationists to-day probably consider the tonic solfa system to be a psychologically sound method of aural training (though they see little purpose in making much use of the somewhat complicated system of rhythmic notation) and believe that it can form a useful introduction to reading from staff notation at the junior stage. Little purpose is achieved, however, if only occasional use is made of the syllables, for their value depends entirely on the ease and fluency with which they are used by both teacher and pupils.

It may be argued that, with the increasing use of simple instruments in class music teaching, staff notation and the letter names of notes should be introduced from the outset (Mainwaring, 1951). The introduction into the classroom of xylophones, glockenspiels and other simple melodic instruments associated with the system of Carl Orff, as well as of recorders, bamboo pipes and harmonicas certainly makes possible an entirely new approach to pitch training, though much more investigation will have to be carried out before we can dispense entirely with the more old-fashioned methods of approach.

Since musical literacy is of such obvious importance, teachers of music devote (or should devote) much attention to training children to read at sight (though not necessarily at first sight) from musical notation. Modulator exercises are no substitute since it is the phrase, not the note, which is the unit in music and only by reading from musical notation can children acquire the important habits of looking ahead and thinking in terms of phrases. Older collections of sight-reading exercises were too often quite devoid of musical interest and several recently published collections are anthologies of phrases from songs and instrumental works. In this way training in musicianship and appreciation are effectively linked together. Allied activities which can train children to hear with their eyes and see with their ears are musical dictation and melody making; the latter is of particular value owing to the importance of developing whatever creative powers children possess. From such simple beginnings, children can eventually progress to the reading of simple orchestral scores, perhaps projected onto a screen.

MUSICAL APPRECIATION

The report, "The Education of the Adolescent", declared that the purpose of music in schools should be "rather the cultivation of a taste than the acquirement of a proficiency; it should lay the foundation for intelligent study and enjoyment of music in after life". Similarly the report "Music in Education" suggests that the aim should be "not to form professional musicians, but to develop the appreciation, taste and critical judgment of the listener from his earliest youth, so as to train him and enable him to appreciate the beauty and wealth of musical masterpieces" (UNESCO, 1955). It has been recognised for many years that listening to music is just as much an art as performing and composing. Intelligent listening to music, far from being a passive affair, demands "alertness, quickness of perception, power of analysis and concentration" (Donington, 1932). It was this recognition which led to the development of the musical appreciation movement in this country. The need for training in the art of listening to music was persuasively advocated by Stewart Macpherson (1910) and Percy Scholes (1953). The need has never been greater than at the present time. Music blaring from transistor radios and juke-boxes seems to form a constant background to the lives of many young people—so constant, indeed, that they are probably only vaguely aware of this "aural wallpaper" and have come to regard silence as an irritating distraction. Moreover, much of the music to which they do pay attention is of very inferior quality. With the enormously increased earning capacity of young people, it is hardly surprising that the record companies should devote so much attention to the teen-age market. The principal record companies have set up exploitation departments (over one seventh of the cost of each record sold goes towards the expenses of these departments) and each year seventeen million pounds is spent by teen-agers on records and record players. It would of course be quite unrealisitic to condemn out of hand teen-age interests and weaknesses. Nevertheless, it is a prime duty of teachers of music in schools to do all they can to develop their pupils' musical tastes and discriminatory powers and thus to build up their resistance to the blandishments of commercialised exploitation. How can this be achieved? There is of course no easy solution and teachers have come to realise that many of the once-popular methods are of doubtful value. Thus lessons in musical form, in which the teacher simply dissects pieces of music and applies such labels as "binary" and "ternary", have little to commend them. There is no denying that some knowledge of musical form and design is necessary if we are to listen to music intelligently, but the subject must be approached in an imaginative way. Musical history must be presented in a similarly resourceful manner if it is to be of value and to add to the children's understanding of the music they hear. Above all, the teacher must guard against the tendency to be little more than a disc jockey, relating chatty anecdotes of doubtful authenticity about the lives of composers. This is not to suggest, however, that some knowledge of a composer's life and the social and economic conditions of his times cannot be of value. It is useful, particularly in teaching older children in grammar schools to draw attention to the relationship which exists between the various arts—to compare, for instance, the music of Debussy and Ravel with the poetry of the French Symbolists and the paintings of the Impressionists (Scholes, 1923). It is also important that we should not neglect to introduce twentieth-century music into the syllabus; otherwise children gain the impression that all serious music was written by composers long since dead. The practice is gaining ground in secondary schools of including a study of jazz in the survey of contemporary music and considering its influence on serious composers.

The increasing number of aids now available to the music teacher enables him to bring children into contact with a wide range of music. There is, however, no substitute for a live performance and an important aim of school music is to develop the concert-going habit amongst young people. In recent years there has been a considerable increase in the number of orchestral concerts arranged for young people by local authorities. It is now recognised that many of the concerts arranged for children during the pre-war years had serious defects and were often of limited educational value. The programmes and individual items were often too long, and the children were either irritated by being talked down to or wearied by lengthy, technical discussions of the music to be played; the most serious defect was that the children were given little or no preparation at school prior to the concerts. Many authorities now, however, provide notes on the works to be played for the guidance of teachers, as well as programme notes (quoting important themes) for the use of the children. The practice is also being adopted of arranging concerts for older pupils from grammar and technical schools, such concerts including one or more extended works. A further development, particularly valuable in less populous areas, has been the giving of concerts by small orchestras and ensembles in the schools themselves.

Music Making in Schools

It is generally agreed that active listening to music is best achieved by active participation in music making. Such participation, at its most rudimentary level, can take the form of responding by bodily movement either to the structure of the music or to its mood and character. This form of participation can lead, not only to a more lively appreciation of the music heard but, it is increasingly felt, can have a definitely therapeutic effect as an outlet for intellectual and emotional tension. (Driver, 1937; Gell, 1960). Responding to music in mime has become a popular activity in some schools in recent years (Gray and Percival, 1962).

The most obvious forms of participation in music making are singing and instrumental playing and it will be necessary to consider in some detail the principal developments in these branches of the music syllabus.

There has been a marked change in the approach to voice training in schools in recent years. It is now realised that vocal exercises, if they are to serve a really useful purpose, must always be closely associated with the songs the children are learning. With younger children, it is recognised that formal exercises are quite unsuitable and that these children learn best by imitating the vocal patterns set by the teacher. Droners and growlers are no longer necessarily regarded with despair by the teacher: the results of tests of musical ability have confirmed that it does not follow automatically that droners are lacking in aptitude and it has been found that, if suitable remedial treatment is adopted at an early stage, some of them can develop quite pleasing voices. Perhaps the most important development in voice training has been in the attitude to the boy's changing voice (Mellalieu, 1935; McKenzie, 1958). It is now realised that it is not at all necessary for the adolescent boy to give up singing for a time provided that he uses his singing voice gently and that the songs he sings are so pitched that he is not forcing high notes when he should be developing new low ones. Much suitable music, composed or arranged for adolescent voices, is being published at the present time.

Equally interesting have been the changes in what is regarded as suitable music for the singing lesson. Until the turn of the century, the majority of songs written for use in schools were of a didactic nature. Temperance songs were popular as were those which inculcated lessons of morality and industriousness. One such song included in the widely-used "Educational Vocalist" (Curwen) had as its chorus:

> Work's the pith of life, my boy,
> Work and do not falter;
> Work will bring success and joy;
> Wait's the sluggard's halter.

A sentimental song, typical of many used in schools at that time and included in the above collection, is entitled "Be kind to the Loved Ones at Home". One verse runs:

> Be kind to thy father—for now he is old,
> His locks intermingled with grey,
> His footsteps are feeble, once fearless and bold,
> Thy father is passing away.

Many educationists of the time were of course genuinely convinced of the value of such songs. Referring to their "refining influence", A. Watkins, in *Singing in Elementary Schools* (1885), declared: "How often has a teacher, on taking charge of a class containing rough and insubordinate pupils, resorted to the charms of song, and softened the turbulent spirit of many a rude boy by teaching some of the pathetic pieces by Mrs Hemans, etc." The folk song revival in the 1890's brought about no immediate improvement in the quality of school songs, but soon after the appointment of Somervell as Chief Inspector in 1901, Stanford published his *National Song Book* which has been widely used in schools ever since. It was also at this time that leading British composers began to turn their attention to the needs of schools, and many of the songs they composed were published by the Year Book Press; these songs became widely known, in many cases, as a result of their being used as test pieces at competitive festivals. At the present time such composers as Benjamin Britten are composing music intended for use in schools and the folk-song repertory has been widened to include European and American traditional songs. Choirs have been formed in most secondary schools and there are instances where choirs from boys' and girls' schools in the same vicinity combine for the performance of ambitious choral works and extracts from, or adaptations of, suitable operas. A number of operas, specially composed for schools, have been published in recent years but unfortunately very few are wholly successful.

There can be little doubt that the most important post-war developments in school music have been in the field of instrumental playing. There are several reasons for the current interest in this form of music making in schools. Instrumental playing, even if it is only simple percussion playing, can lead to a much more lively understanding and enjoyment of orchestral music than is possible in the conventional appreciation lessons. It can stimulate an interest in music in those children to whom singing makes but a limited appeal and there is obvious value in the concentrated effort demanded in instrumental playing as well as in the experience gained in group performance. Moreover the wide variety of instrumental music "caters admirably for varying degrees of aptitude. A boy may fail at the violin and succeed with the trumpet or clarinet" (Standing Conference for Amateur Music, 1960). The introduction of simple instruments into the classroom provides children with a real incentive to learn musical notation and, as already indicated, makes possible an entirely new method of approach in laying the foundations of musicianship. Recently published school music courses which teach the language and notation of music with the aid of simple melodic instruments have been written by Fiske and Dobbs (1956) and Warburton (1961).

The high cost of musical instruments, however, presents serious problems and some schools have attempted to overcome them by giving the children opportunities to make their own instruments (Blocksidge, 1957; Mandell and Wood). Some LEA's unfortunately have made little provision for instrumental tuition in schools: "At present the picture of the whole situation is an extraordinary one: some authorities are spending considerable sums in providing teaching services and equipment; others are doing little or nothing. In many places, in spite of high enthusiasm and a real desire to get something done, the work has grown up in haphazard fashion, without plan or far-sighted purpose, so that there is much wastage of effort and money . . . unfortunately the rapidity of the increase (in instrumental instruction), encouraging though it is, has served to show how lamentably unready and ill-equipped the schools of the Country as a whole are to meet it." (Standing Conference for Amateur Music, 1960.) In some areas, however, the situation is very encouraging. In the County of London, for instance, 60,000 children are learning to play musical instruments and the L.C.C. spends £9,000 annually on the purchase of instruments for schools and provides free tuition; there are about one hundred school orchestras and brass bands as well as the two orchestras of the London Schools' Symphony Orchestra. As a further example, in Nottinghamshire over eight hundred pupils are learning stringed instruments and a further one hundred and sixty are learning orchestral percussion and wind instruments.

Violin classes, taken by peripatetic instrumental teachers, have been held in schools for many years and stringed instruments are by far the most widely taught in schools. For economic reasons the violin has to be taught to groups of pupils. Although group instruction has obvious limitations, it also has a number of advantages as far as beginners are concerned. There is, however a shortage of instrumental teachers qualified in group instruction and the Rural Music Schools' Association has done valuable work in recent years in promoting the study of methods of group teaching (Hale, 1953; Collins, 1962).

There has been some increase in the post-war years in the number of children learning wind instruments, in spite of the serious difficulties connected with the cost of such instruments (particularly woodwind) and the shortage of suitably qualified teachers. Because of the appeal of brass instruments to adolescent boys and the fact that much more rapid progress can be made in learning brass than stringed instruments, brass bands have been formed in many secondary schools during the last few years. The National Youth Brass Band of Great Britain was formed in 1952.

A notable advance in school orchestral work in recent years has been the great increase in the number of summer schools and holiday courses for young instrumentalists and the formation of several youth orchestras.

The forerunner of these youth orchestras was the London Junior Orchestra, founded by Ernest Read in 1926. Many of its members (aged 17-25) were students at the various London Colleges of music and rehearsed at the R.A.M. In 1932, the London Senior Orchestra was formed for the benefit of professional students (many of whom later joined professional orchestras) and teachers of music. It is this orchestra which has given so many of the popular "Ernest Read

Orchestral Concerts for Children". Ernest Read has also directed summer courses in orchestral and chamber playing at Queenswood School, where tuition is also available in string and wind ensemble playing. Three orchestras (for advanced and experienced players, less experienced players and average amateur players) form the backbone of the course and rehearse twice daily; sectional rehearsals are also held.

The Ernest Read Music Association has been formed for the purpose of "ensuring the permanence and stability" of the two orchestras, the Special Choir (established in 1943), the Ernest Read Orchestral Concerts for Children and the summer courses.

In 1944 the Music Teachers' Association held the first of its annual orchestral courses at Sherbourne for instrumentalists aged between 12 and 18. The Association has organised these courses with the purpose firstly of encouraging more intensive study than is possible during the school term and secondly of providing young instrumentalists with the opportunity of playing in a full orchestra or, if they are less advanced, of playing in an orchestra or ensemble best suited to develop their playing. As with the Ernest Read courses, there are three orchestras. Children under 16 generally apply to their L.E.A. for a grant towards the cost of the course and those over 16 for a Further Education Grant.

In addition a number of local education authorities have established their own orchestras, the members being drawn from the schools in the area. As long ago as 1923, the Manchester Education Authority formed the Manchester School Children's Orchestra and more recently the Bournemouth L.E.A. established three central orchestras (junior, intermediate and senior), boys and girls who had left school and had become members of adult educational and recreational centres being encouraged to join and thus maintain the interest in orchestral playing.

Several L.E.A.'s have recently followed this example and established county youth orchestras for young people aged between 14 and 21; residential courses of a week's duration are held periodically, generally along the lines of those of the National Youth Orchestra. In addition, some local authorities have formed junior music schools, providing tuition not only in the playing of orchestral instruments but also in piano-playing and musicianship. The children who are awarded exhibitions receive tuition, generally on Saturday mornings, in instrumental-playing and musicianship and take part in rehearsals of orchestral and choral works.

Many talented children, from all types of secondary school, are thus now being given the opportunity to receive expert tuition in music, irrespective of their parents' financial resources. Many private teachers of music are somewhat apprehensive about this new development, fearing that their best pupils will leave them if they are given the opportunity to receive private tuition. It is important to remember in this connexion, however, that in the past many children, who began by joining a violin class at school and who would not otherwise have taken up the study of a musical instrument, took up lessons privately at a later stage.

The National Youth Orchestra of Great Britain was founded in 1947 by Miss Ruth Railton and held its first course in Bath in April 1948. It has received financial assistance from King George's Jubilee Trust and since 1952 has been sponsored by the Daily Mirror Newspapers Ltd. Young people between the ages of 13 and 16 who have reached approximately Grade 8 standard of the Associated Board may apply for auditions which are held annually in most large towns. Those accepted receive scholarships or L.E.A. grants and meet for a week three times annually in different parts of the country. They work together as a full symphony orchestra, as well as studying individually and in sections, and tuition is available also in composition, chamber-playing and conducting. The orchestra, which gives a concert at the end of each course, has played several times at the Edinburgh Festival and the Proms as well as in Western European countries and the U.S.S.R.

GENERAL INFLUENCES

Within a quarter of a century the scope of school music in this country has thus widened enormously. We must now consider some of the principal factors responsible for the imposing developments made in the field of musical education and the improvement in methods of teaching.

Many of the results of investigations conducted in the field of educational psychology have had an important bearing on methods of teaching music in schools. This is to be expected since music is essentially an activity of the mind (Lowery, 1952) and several prominent psychologists have made detailed studies of the psychology of music (Mursell, 1937; Seashore, 1938; Revesz, 1953); there still remains, however, much research to be carried out in this field. Knowledge of the transfer of the effects of training has prompted teachers of music to reconsider the purpose of breathing and vocal exercises in singing lessons and of scales, arpeggios and other technical exercises in instrumental lessons. Similarly, the researches of the Gestalt school of psychologists have resulted in a new approach to the teaching of songs and musical form (Mainwaring, 1954). Investigations into the nature of musical ability have not only led to the devising of valuable tests of musical ability (Wing, 1948), but have also confirmed that the proportion of children able to benefit from a comprehensive and varied course in music is much larger than is generally supposed (Mainwaring, 1951).

There can be little doubt that, in recent years, English musical education has been influenced by the musical achievements of the American high schools, with their glee clubs, "a capella" choruses, symphonic bands and orchestras. Also the recent introduction of simple musical instruments into our classrooms has been inspired to a large extent by the practice in German schools. Our own public schools have also influenced developments in the state schools, particularly in the choral and instrumental fields. Until Thring's appointment of Paul David at Uppingham in 1865, music had been very much the Cinderella of the public school curriculum. However, thanks to the pioneer work of such imaginative and resourceful directors of music as Farmer and Faning at Harrow, Johnson at Rugby and Eton, Sweeting at Rossall and Winchester and Spurling at Oundle, music has come to occupy a most important place in public school life. The task of directors of music in these schools has, of course, been facilitated by the greater time and finances available as well as by the appointment of several full-time assistants and specialist instrumental teachers. Nonetheless, the radical change in the attitude to music in our public schools has come about in an astonishingly short space of time, and for several years now solo and chamber ensemble playing, inter-school concerts, house competitions and celebrity recitals, as well as programmes of large scale choral and orchestral works, have featured prominently in the musical life of these schools (Smith, 1947).

The musical festival movement has done a great deal to improve the quality of music-making in our schools. The name of Miss A. N. Wakefield is generally associated with the movement, and it was largely as a result of her work that the "Association of Competition Festivals" was formed in 1905; this was the precursor of the "British Federation of Music Festivals", formed sixteen years later and to which over 270 competitive festivals are now affiliated. The festival movement has, of course, had its critics. They maintain that the competitive element in music is undesirable, that many schools devote time to preparing for festivals at the expense of school work, and that it is wrong for children and parents to hear an adjudicator being critical of the work of teachers. Whatever the validity or otherwise of these arguments, there is obviously room for a musical festival of a different type to supplement the work of the Competitive Festival. The Non-competitive Festival Movement came into existence largely as a result of the work of a Shropshire headmaster, Ulric Brunner, and in 1927 the first Non-competitive Festival was held at Bridgnorth, Shropshire. The movement has flourished in recent years, and has received the encouragement of Dr Geoffrey Shaw, Cyril Winn and others.

A non-competitive festival generally begins with the director listening to the performances given by the various schools. The conductors from the various schools are given the director's written comments and also have the opportunity to meet the director informally for further discussion. This is followed by a rehearsal of the combined choirs in preparation for a concert (Priestley).

Many schools organise their own musical competitions on the lines of an Eisteddfod, a local professional musician acting as guest adjudicator. As many group activities as possible are generally represented and often include classes for vocal and instrumental soloists and duettists, recorder consorts, house choirs (conducted by senior boys or girls), melody-making, sight-reading, recognition of themes, etc.

Advisers in music, appointed by many but by no means all, local authorities have done splendid work in promoting the advancement of musical education in this country. Similarly valuable has been the work of a number of associations devoted to raising the standard of music teaching in our schools. The Music Teachers' Association, founded by Stewart Macpherson in 1908, has succeeded well in its endeavour "to foster better musicianship, wider general culture and co-operation among music teachers" and "to promote progressive ideas on the teaching of music and to further the cause of music in education". The Association has achieved this partly by means of the vacation courses it has organised for teachers of music, the first one having been held in 1911. The Rural Music Schools' Association, to which reference has already been made, had its origins in the work of Miss Mary Ibberson with the Letchworth Educational Settlement in the early 1920's. The first Rural Music School was opened in Hertfordshire in 1929 and in 1946, the Federation of

Music Schools became the Rural Music Schools' Association. There are now rural music schools in nine counties. To the Schools' Music Association are affiliated 88 Schools' Music Associations as well as local education authorities, University Departments of Education and Teachers' Training Colleges. It has organised courses for teachers of music and holds an orchestral course every Easter; it has also held three National Festivals of Schools' Music since the war at the Royal Albert Hall and in June 1962 inaugurated the first Primary Schools' Festival of Music.

In 1945 the School Music Section of the Incorporated Society of Musicians was formed by the amalgamation of the two former sections: the Music Masters' Association Section and the Music Mistresses' Section. Two of its aims are "to promote whatever may tend to the elevation of the status and improvement of the qualifications of teachers of Music in Schools" and "the advancement of Music in Education and matters connected herewith".

In the post-war years several experiments have been made in international collaboration in the sphere of musical education. As long ago as 1929 an Anglo-American Conference was held at Lausanne. In 1949 UNESCO founded the International Music Council which, four years later, arranged an International Conference on "The Role and Place of Music in the Education of Youth and Adults" in Brussels (UNESCO, 1955). This conference set up the International Society for Music Education. The British committee of the I.M.C. is the National Music Council of Great Britain which, in 1960, organised a conference: "Music in Britain—To-day and To-morrow". The fourth International Conference organised by the International Society for Music Education was held in Vienna in 1961.

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THE EFFECT OF DISTRACTIONS ON THE WORK OF PRIMARY SCHOOL CHILDREN

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1. INTRODUCTION

SCHOOL CHILDREN have to contend with many distractions at school. These distractions probably reach their maximum in schools such as those sited next to a busy railway line where the noise of a passing train might be sufficient to drown the words of the teacher. In some overcrowded schools two classes occupy the same room. In other schools where the buildings have been badly designed, the noise of one class engaged in a physical education lesson reaches several other classes. Even in the small country school where there is only one class and only a dozen or so children, distractions may be encountered in the form of passing aeroplanes or flies on the window pane.

The hypothesis which led to this experiment was that children become accustomed to noises which occur frequently or regularly and that such noises lose their power to distract. Even unusual noises and interruptions, it was thought, would fail to distract children from their work providing they were sufficiently interested in what they were doing. It was also thought that the effect of distractions on the work of children is often overestimated mainly because many adults are very easily distracted. With children it appears that the greater is the ego involvement the less is the power of distractions to distract. With many adults the opposite seems to apply; the more important the task and the greater the need for concentration, the more annoying and distracting do noises and interruptions appear to be.

If the hypothesis was shown by the experiment to be incorrect then this would seem to point to the desirability of all those concerned with the education of young children endeavouring to shield them from distracting influences. Those who plan the building of new schools would need to pay careful attention to the siting of the school and the layout of the buildings. Head-teachers would need to make constant efforts to reduce distracting noises within the school, and teachers would need to curb the excesses of their own classes if they were within earshot of another class. It was recognised that most educationists are already aware of the possible effect of distracting influences but in the apparent absence of relevant experimental work it is impossible to estimate how harmful any noise or interruption might be.

It would probably be agreed that adults can often sustain attention by effort of the will but it seems unlikely that young children can be sufficiently aware of the need for attention to different stimuli and that consequently they attend to whatever wins the battle for their attention. This is probably determined merely by interest; the activity which is most interesting to the child claims his undivided attention. These statements are only conjectural, however, because of the absence of experimental evidence to corroborate them.

That is not to say that there have been no experiments on the subject of distractibility. Other experimental work concerned with the effects of possible distracting influences on such tasks as reading, problem solving and test-taking are numerous but they have produced conflicting results. Whitely (1), Fendrick (2), Liepold (3), Mitchell (4), and Henderson, Crews and Barlow (5), are some of the workers who have shown their distractions to have been effective in causing poorer performance of the tasks. On the other hand, many others have conducted experiments in which the distractors produced no adverse effect on performance, they include: Morgan (6), Hovey (7), Miller (8), Obata, Morita, Hirose and Matsumato (9), and Freebourne and Fleischer (10). Some studies such as those of Liepold (3) and Mitchell (4), suggest that the amount of distraction differs for different levels of intelligence while others such as Hovey (7) disagree. In these experiments many different distractors were used such as different types of music, bells, buzzers, whistles and speech. But from all of this no consistent result emerges.

In any case, the subjects in the above experiments were adults, mostly university students, and whatever may be true of adults need not necessarily apply to children of Junior School age. Similarly the work of Gutteridge (11), Hildreth (12), and Moyer and Gilmer (13), throws much light on the question of attention in children aged six years and under, but tells us little about older children and the school situation.

2. DESIGN OF THE EXPERIMENT

Although the range of possible distractions to school children is very wide and although there are many activities in schools which may suffer from distracting influences, it was necessary for this experiment to restrict the distractions to three which are common to many schools and to restrict the activities to four tasks, the performance of which could easily be measured.

The conditions were as follows:

(D1) No distraction. Here an effort was made to avoid all possible distracting influences for this condition was to serve as a control.
(D2) A gramophone was used to produce country dance music during the whole time in which the tasks were being worked.
(D3) Another class was used to perform physical education activities immediately outside the classroom in which the subjects were working.
(D4) Five children were employed separately to deliver notes to the "teacher" at irregular intervals.

The distractions were planned with normal teaching experience in mind. P.E. noise, music from the music lesson or the country dance lesson in the hall, and interrupters entering the classroom for many different reasons are all commonly experienced in normal class teaching.

The four tasks were as follows:

(T1) Copying a prose passage.
(T2) Adding sets of numbers, ten figures in each set.
(T3) Letter sequences were shown to the children for ten seconds after which there was a period of twenty seconds in which they were to write the sequence down.
(T4) Reading a prose passage followed by the answering of ten questions about that passage.

The choice of a very difficult passage in T1 was deliberate. The subjects would have no idea what they were writing about so although they might be interested in performing the task accurately they could have no interest in the subject matter itself. Such tasks must play a very small part in modern education but they do occur as an essential part of some more important activity. For example, the working of a mechanical arithmetic sum might involve writing down the figures from a text-book before the calculation is carried out. It is important that such routine work is carried out accurately but it may be that a child is most vulnerable to distraction when he is engaged in an activity which requires very little thought. The measure of distraction was to be the number of mistakes which the children made in copying the passage.

In the number adding task, T2, only the correct additions were noted; no account was to be taken of those answers which were wrong. Although this activity must be most uncommon, it is one which requires the utmost concentration and thought which are necessary to many school activities. This form was chosen because it facilitated measurement. Children of all the ages involved were able to make some score and sufficient sets were provided so that even the most able children could work throughout the ten minute period.

For the letter sequence task, T3, the letters were capitals, three inches high, written on lightweight card. No vowels were used because they would have created syllables which would have aided recall and altered the grading of difficulty. The first cards had only three letters but the number increased up to nine for the last two cards. Only all-correct sequences were scored. Again, this task is not likely to be used in any school but children are often called upon to remember what they have seen and this was considered to be a means of measuring whether distractions affected remembering.

In the reading comprehension task, T4, the similarity with school activities is readily seen. The prose passage was put out of sight before the children began to answer the questions, so this task involved both concentration and memory. The passage was taken from the Neale Test of Reading Ability and two questions were added to the eight which go with that test in order to bring the number of questions up to ten. The additional questions were very simple so that the young and less able children would be almost certain to make a score. In fact, five children were unable to score on this test but this number is not large enough to invalidate the test.

In order to obtain a measure of the effect of the distractions on the performance of the tasks it was decided to use the statistical technique known as the "Analysis of Variation". It was decided to divide each class to be used into four groups. A Latin Square (Table 1) was then devised which would allow for each group to perform every task once while working under a different distraction on each occasion. It was then decided to carry out this design with four different classes.

TABLE 1

LATIN SQUARE SHOWING DISTRACTION ORDER AND THE TASKS TO BE PERFORMED BY EACH GROUP IN CLASS 1

		Distraction Order			
		Run 1	*Run* 2	*Run* 3	*Run* 4
		Nil.	*Gramophone.*	*P.E.*	*Interruption*
		D1	D2	D3	D4
Tasks	Writing. T1.	1	3	2	4
	Number Adding. T2.	3	4	1	2
	Sequence. T3.	2	1	4	3
	Comprehension. T4.	4	2	3	1

The same Latin Square was used with each class but the distraction order was different so that the following randomisations were obtained:

(i) Each task was with each distraction four times.
(ii) Each distraction was with each task four times.
(iii) Each distraction was in each position in the sequence four times.
(iv) Each distraction was immediately preceded by each other distraction four times.
(v) Each task was in each position in the sequence four times.
(vi) Each task was immediately preceded by each other task four times.

The experiment was carried out at a County Primary School in Birmingham. The school was organised in two streams, A and B, with mixed classes. The classes used for the experiment were as follows:

Class 1—4th Year "A" stream (C1)
Class 2—4th Year "B" stream (C2)
Class 3—3rd Year "A" stream (C3)
Class 5—2nd Year "A" stream (C4)

The children were placed in their groups by Random Numbers. The boys and girls were treated separately and then brought together to ensure that each group contained the same number of boys and girls.

The administration of the tests was complicated, so to ensure that it could be done satisfactorily without error or delay which would invalidate the experiment, it was necessary to conduct a pilot experiment. This was carried out at a Mixed Junior County Primary School in Northumberland. Only one class was used but it completed all that would be asked of one class in the actual experiment.

In other words, the tests were run under each of the four conditions and every group carried out each of the four tasks.

The pilot experiment was invaluable in that it revealed the difficulties likely to be encountered and gave necessary practice in the administration of the tests and the organisation of the distractions. A procedure was worked out in advance and the actual words of instruction to be spoken were written down so that this could be repeated exactly, or modified in the light of experience.

In the experiment proper, care was taken to ensure that no distraction other than that which was planned should interfere with the performance of the children. With the considerable help and cooperation of the head teacher and staff of the school, no unplanned distraction occurred and on those runs during which the children were supposed to work without distraction they were, in fact, free from noise and interruptions.

The record-player for the gramophone distraction, D2, was situated in the headmaster's office but it was possible to plug in the loud speaker in any of the classrooms. The record was a country-dance record "Gallopede", and it was played at medium volume while the tasks were being performed. The fact that the speaker was inside the classroom meant that this was unlike normal experience but the distracting effect would not be less than what is encountered in normal teaching.

The headmaster himself kindly undertook to provide the P.E. distraction noise, D3. On the four occasions on which it was used, he took a class of children into the school playground and engaged them in activities which produced noises similar to those normally experienced from a class engaged in a P.E. lesson. The only difference was that again the noise was much greater than that which one would normally have to contend with. Children shouted, skittles fell, large plastic balls hit the windows and altogether the noise was much greater than the experimenter would have felt justified in causing himself, being a visitor in the school.

Finally, the interruption distraction, D4, was provided by five children from the school, two boys and three girls. It was arranged that their appearance should coincide with the display of a letter sequence card. So that there was no fear that the distracting effect would be reduced by the children becoming used to the regularity of their appearance, it was arranged that the interruptions would occur on display of the 4th, 6th, 11th, 14th and 19th cards. It was discovered that the sequence cards could easily be held in position by pushing them between the blackboard itself and the strip of wood at the top which held the blackboard firmly but not tightly. The door was opened from the inside about two inches by an assistant immediately before the sequence card was exposed. The interrupters, who were waiting outside, recognised the signal and entered just as the card was placed in position. They then walked up to the "teacher" and handed him a note. They remained standing immediately beneath the card while the note was read. The card was then taken down and the note returned to the interrupter who was thanked and told to leave the room. The words were inaudible to the children engaged on the tasks.

Apart from the fact that two or three dhildren in one class found a way of recording the sequence while it was exposed, the whole of the experiment was carried out without any impediment or difficulty. It was unfortunate, however, that some of the children who took the first two tests were absent when the second two were carried out. This meant that their scripts had to be excluded from the experiment altogether and caused the groups to be uneven. This could probably have been avoided if the four runs with each class had been carried out in one morning or one afternoon. It was considered undesirable to do this, however, because of the possibility of fatigue affecting performance for the third and the last run. As it was, the tests were carried out in pairs, the two runs taking one quarter of a day, e.g. from immediately after morning registration to break, or from break to midday. The tests themselves ran for only ten minutes but the seating reorganisation, handing out of papers and explanations took some considerable time.

It took one full day and two half days to complete the experiment. Towards the end of the experiments it was evident that the children had been discussing the tests and the distractions although there was no evidence that they had any idea of the true object of the experiments. It may be that the knowledge that the distractions were deliberate affected the performance to some extent but it is difficult to estimate in what way. It is possible that some children succumbed more easily to the distractions when they knew them to be deliberate or it may be that others were all the more determined that their performance should not suffer.

3. STATISTICAL ANALYSIS

The Table of Analysis of Variance, Table 2, has been compiled from the data obtained from the scripts of the subjects. If Snedecor's

"F" Test is applied to the data in Table 2, significant Main Factors and Interactions are revealed.

TABLE 2

TABLE OF ANALYSIS OF VARIANCE

Nature of Effect	*Source*	*Sum of Squares*	*d.f.*	*Variance Estimate*
Main factors	D	10	3	3·3
	T	14,801	3	4,933·6
	C	712	3	237·3
Interaction between pairs of factors	DT	100	9	11·1
	DC	27	9	3
	TC	1,088	9	120·8
Interaction of all factors	DTC	328	27	12·148
Replication	Residual	5,059	536	9·438
		22,125	599	

The main object of this experiment was to determine whether the three distractions affected the performance of the four tasks. That the distractions had no such effect is indicated by the non-significance of the Main Factor "D" (Distractions). This is so despite the fact that the P.E. distraction was more extreme than that normally experienced in schools. The gramophone distraction was also louder than one would expect to contend with in most schools, the loudspeaker being placed in the room in which the subjects were working. It seemed unlikely that the interruption distraction would affect the performance of the children engaged in the tasks of Writing, Number Adding or Comprehension providing they were adequately motivated. Apart from the sound of the opening door there was no noise attached to this distraction and many subjects appeared to be unaware of the presence of the interrupters. It was thought that this distraction might seriously affect the performance of the groups engaged in the "Sequence" task because the interrupter appeared at the beginning of the ten second period during which the card was exposed and remained standing directly beneath the card until it was taken down. Apparently this had no distracting effect.

The Main Factor "T" (Tasks) shows a high degree of significance but this merely reflects the differing mark value of the four tasks. The "Writing" task produced a negative score for it was the number of mistakes that was recorded. Because of this many children gained a score of "O" but the range was 20. In the "Number Adding" task the highest score was 31 and the range was 30. In the "Sequence" task the highest score was 19 and the range was 17. In the "Comprehension" task the highest actual score was 9 and the range was 9. If the tests had been of comparable difficulty, i.e. if the mark range and average score had been similar, the "T" effect might not have been significant.

The Main Factor "C" (Classes) is also seen to be significant but again this merely indicates that the classes varied in ability which one would consider inevitable in an experiment which uses classes from three different age groups and two ability "streams".

The "DT" (Distraction/Task) interaction falls short of showing significance even at the 5% level which indicates that no single task was adversely affected by the distractions.

The "DC" (Distraction/Class) interaction is obviously non-significant. We have already discovered that the overall effect of the distractions was non-significant. The "DC" interaction gives the additional information that no class, taken in isolation, was affected by the distractions to a significant extent.

The "TC" (Task/Class) interaction is readily seen to be significant but this is not of interest so far as the original hypothesis is concerned. This appears to show that the older and more able children have shown their superiority more clearly in the tasks in which they have received instruction and practice at school, namely Writing (T1), Number Adding (T2) and Reading Comprehension (T4). The difference in ability was not so readily seen in the Letter Sequence Task (T3), probably because this material was unfamiliar.

The "DTC" (Distraction/Task/Class) interaction of all factors is significant at the 1% level but examination of the data did not reveal any consistent effect.

4. Conclusion

The results of this experiment appear to reinforce the belief that distractions in the form of P.E. noise, country dance music and interruptions do not interfere with the performance of children when they desire to obtain good results from the task in which they are engaged. It is recognised, however, that there remain many school activities which might be subject to distraction.

In this experiment the tasks were presented to the children as "tests" and they were asked to do their best. No further effort was made to improve the ego-involvement of the children but the use of the word "test" is sufficient to induce most children of junior school age to give of their best. In any case, the impression was gained that the children used in this experiment were keen to do their best work.

There was only one child who showed anxiety. After the test he complained that he was unable to add the numbers properly because of the noise of the class doing P.E. in the playground. Despite this complaint, his score for the test compared favourably with those of other members of the class but the incident might be taken as evidence that he was anxious to do well and that other children were also anxious to gain high marks even although they were not prompted to make a similar complaint.

In normal class teaching it is difficult to maintain the motivation at this level and similar distractions to those used in this experiment might have an adverse effect at a lower level of motivation. It would be difficult to devise an experiment which would simulate ordinary everyday classroom activities and would also provide a measure of the effect of the distraction. The everyday quota of sums, the English exercise or "composition" could all suffer as the result of some apparently innocuous disturbance. We cannot be certain about this until experiments are carried out the results of which will give us some definite grounds for forming an opinion.

The oral lesson might be particularly vulnerable to distraction but it would be difficult to devise an experiment which would measure the effect of any distraction because of the difficulty of identical repetition of the lesson. A tape recorder might be used for this purpose but there is an important difference between listening to a tape recorder and listening to a person speaking. Evidence gained from such an experiment, providing it was reliable, would be of great value.

Although the results of this experiment support the original hypothesis, this may have been achieved only because the interest of the children was maintained throughout and they strongly desired to do well. It may be that without such strength of motivation children are very easily distracted. On the other hand, many adults appear to be distracted by comparatively minor disturbances no matter how anxious they are to complete the task in hand. Can it be that the older we become the more vulnerable we are to distractions? This is an interesting question which might repay further study.

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THE REVISED CODE: A CENTENARY NOTE

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FOR every person familiar with the 3 A's of the Education Act, 1944: "age, ability and aptitude", there must be a thousand who can more readily explain the phrase "the 3 R's". Yet the former have now been at the heart of British educational practice for nearly twenty years, while the heyday of the 3 R's was over before the end of the reign of Queen Victoria. It was during the period of payments by results, instituted by the Revised Code of 1862, that the phrase "the 3 R's", then some half a century old (1), gained the universal recognition of becoming an everyday word. Passed under the Minute of the Committee of the Privy Council on Education dated 9th May 1862, the Code began to be applied this autumn term one hundred years ago (2).

The Revised Code revised the set of regulations for the administration of state-aid to elementary education (including the training of teachers) which had grown up since the Committee was established in 1839, and had been first brought together for publication in 1860. It had been put forward in July 1861, and passed ten months later with slight modifications, after bitter public controversy and heated Parliamentary debates. Its essential features were that all direct financial contact between the government and teachers, including pupil-teachers, in aided schools ceased, and they had to bargain individually for their pay with their school managers to whom public money would now be disbursed in lump sums; and the amount of any school's grant would depend, for children under 6, on good attendance alone, and on good attendance combined with the results of individual examinations in basic subjects, on a rigidly pre-determined scheme, for older children, compulsorily for those between 8 and 12 (3).

The motives behind the Revised Code were primarily, if misguidedly, economic. The Parliamentary grant for elementary education amounting in about 1860 to *ca.* £800,000 p.a., and increasing quite rapidly, was considered too heavy a burden on the Exchequer (4). The sum represented, in fact, just over 1% of the government expenditure, but many deemed this too much for so marginal and altogether debatable an activity of the state, while the Budget of some £70,000,000 necessitating, *inter alia*, an income tax of 9d. in the pound, was considered excessive. The new system was designed to cut the cost of both aid to education and of the administration involved. To satisfy more progressive circles, much was made of the need to provide incentives to more regular school attendance and more efficient teaching of the basic skills. The Revised Code is generally associated with the Report of the Newcastle Commission, which between 1858-61 had inquired into what must to-day strike many as a self-contradictory task of extending "sound and cheap education to all classes of people". It must be admitted, however, notwithstanding its favourable reference to payments by results, that the Report was used by the authors of the Revised Code with a tendentious selectiveness that was unfair to the Commissioners' breadth of vision.

Payments by results did something to raise attendances and to bring more attention—if not constructive thought—to the teaching of the 3 R's to the less able. But it is not the purpose here to defend or justify the Revised Code. Considering the volume and soundness of contemporary criticism, one could scarcely use even the hollow arguments so frequently used on behalf of unsatisfactory reforms that "it was as good as was possible under the circumstances of the time" or that "it cannot have been so bad if it remained in force for some thirty years". The purpose here, commemoration apart, is rather to draw attention to the lasting damage the system did to educational attitudes as distinct from more temporary harm to educational practice. A hundred years after the event, it is time to review the nature and perhaps shift the emphasis of our condemnation of the Revised Code and its main author.

The traditional criticism of the Code of 1862 has concentrated on its effects on the curriculum and teaching methods, and thus on its more obvious, direct and immediate consequences. It has noted that payments by results tended to narrow down the elementary curriculum to the 3 R's of reading, writing and 'rithmetic. In fact there were of course, 4 R's, the fourth being religious instruction, and one is tempted to add a fifth one: learning by rote; for girls, plain needlework was another basic subject. This criticism is well founded even bearing in mind that "according to the Census Returns

[1851] the great majority of elementary schools both public and private taught nothing beyond the 3 R's" (5), and that five sets of regulations were issued in the two decades following the promulgation of the Revised Code, which modified its restrictive effect by increasing the number of grant-earning subjects. Moreover, it cannot be denied that payments by results brought about a soulless retrogression in teaching methods, and encouraged, at times, dishonesty by teachers and pupils. The architect-in-chief of the Code, Robert Lowe, stands condemned for destructive parsimony (6) and, sabotaging, in effect, the social and cultural rise of the working class.

These criticisms are valid—but they do not explore fully the implications of the Code; neither do they look far enough ahead, and therefore are of limited relevance to the educational issues of to-day.

Lowe, at that time head of the Education Department, bore the main responsibility, for the Revised Code, although R. R. W. (later Lord) Lingen may have played an almost equally important part in the making of it. Lowe's unpopularity in educational circles at the time and since seems fully deserved, but he was more short-sighted than vicious in his forecast of the working of the Code. His most memorable view in this context was that "if the new system will not be cheap it will be efficient, and if it will not be efficient it will be cheap". This may have sounded fair and reasonable—but it was not too difficult to foresee that did the Code, even on its own terms, prove efficient but costly there would have been far more, and more influential outcry against it than if it proved inefficient but cheap —as it did. The system of payments by results flourished until 1890 (and it seems more than a coincidence that for nearly half of that period the country was led by Gladstone with his faith in fiscal retrenchment), when, following the Report of the Cross Commission, Sir George Kekewich began to dismantle it, a task which took another decade to complete. Nor did it take much imagination or wisdom to foresee that standards intended to be minimal would, in fact, become the norm, whether with regard to the breadth of the curriculum or to the school leaving age which the Code virtually fixed below 12, this being presumably the "given age which the labour market inevitably and inexorably fixes" (7). Lowe was preoccupied with economics and tried to view education as another industry whose efficiency was to be measured by the lowness of cost per unit of tangible output. Yet it was ludicrous that he should have considered neither the concept of the economy of high wages, nor the hopeless unsuitability to that industry of piece-rates rather than time-rates as the method of wage payment. In the years following the promulgation of the new Code, while prosperity of the so-called mid-Victorian boom of the third quarter of the nineteenth century continued, annual public expenditure on elementary education fell by over 10%; but this was an illusory saving to the nation. Whether it was Lowe's misconception of education or ignorance of economics that a few years later was rewarded with the Chancellorship of the Exchequer, it is fruitless to speculate. To-day, when much effort is expended on estimating "returns to education" (8), and there is much talk of "national investment in education", great care must be taken lest we return to the commercial standards of "value for money" of the Revised Code. We must remember that the aim of these estimates is to demonstrate that education has much economic value *in addition to* its acknowledged inestimable social and spiritual value, and to render it less and not more vulnerable to latter-day Lowes.

The testing of progress in the 3 R's was virtually a system of external examinations which proved a blight upon and not an aid to true education. At a time when external examinations were becoming important and had positive, progressive associations with careers open to talent and promotion on merit, the working of the Revised Code gave them "a bad Press". For all their expansion since, it would be interesting to establish whether their abuse under the Revised Code bred emotional prejudice against them, particularly in educational circles. And if in one sense "it almost appears [that] Lowe was a forward-looking advocate of objective standardised tests", then he was using them for the wrong purpose of judging attainment and not promise.

At the same time the undiscriminating rigidity of the new Code tended to discredit centralisation in educational matters. It would be surprising if this had not strengthened the prejudice against centralisation arising from the deep-rooted regionalism of English social life. The emphasis placed by the Education Act, 1944, on variety as the keynote of English education, is to some extent making a virtue out of necessity, for a case could readily be made out for more uniformity in administration and even in the curriculum, provided variety and vitality were retained in day-to-day teaching. Again, although to have the local authority play a crucial part in the organising of education has certain merits, the fact remains that it is at times unable or unwilling to spend as much on education as is desirable. It has rightly been pointed out that under the Revised Code education in this country was nearer to being centrally supervised than at any other time (10). This initial experience of the central authority dictating, albeit indirectly, the school curriculum, eight years before state education as such came into existence, was singularly discouraging. If traditionalists were questioning state education for the masses on ideological or religious grounds, more progressive men now came to associate it with meanness and a uniformity that was needlessly stifling. No one would postulate that dissatisfaction with payments by results played a decisive role in keeping centralisation to a minimum in the English educational system, but it must, for better or worse, have stiffened the attitude of opposition to it.

Another perennial educational problem upon which the Revised Code has had a doleful and tenacious effect is that of the supply of teachers. For if more fundamental social forces determined that the school-teacher's status should be low, the operation of the Revised Code depressed it further. Of the three factors which determine the attractiveness of teaching as a career and thereby the supply of teachers, the *average* pay and conditions of work have recently improved more gratifyingly than the social status of the schoolmaster. That it should be relatively low in so status-conscious a country as England is all the more regrettable. It was the attitude of the Revised Code to teachers and their training that suggests that, over and above other considerations, it was a harsh piece of class legislation. It hit not so much "the labouring and other poorer classes" as the mid-nineteenth-century "outsider", the elementary teacher whose education isolated him from the class of his origin while this origin and working *milieu* caused him to be cold-shouldered by the professional middle class. True, there were some arrogant and pretentious elementary teachers; true, they had no right to think of themselves as civil servants just because under the arrangements of 1846 they were paid directly and individually by the government, and their standards of certification were set by the state; but this could not justify the deliberate attempt to "put them in their place" under the Revised Code, the bulk of which deals with their position and training. The teacher was placed in a position of humiliating dependence by paragraphs 79 and 80 of the Code, stipulating respectively that "the managers must annually state whether the teacher's character, conduct and attention to duty have been satisfactory", and "the Inspector must annually report whether the teacher's school is efficient in organisation, discipline, and instruction". (It is, of course, well known and amply attested that it was the working of the Revised Code that left a persistent legacy of unsettled relations between HMI's and teachers.) Moreover, the teacher's authority over the pupil-teacher was diminished—not always a bad thing—by cutting the financial nexus between them, and an arrangement for quinquennial review of the class of his certificate effectively reduced the teacher's freedom of movement (11).

The emergence of teaching as a profession was also checked by tying the curriculum of training colleges more closely to that of the elementary school. With this emphasis on narrow professional training as against personal education, went a dilution of standards of the nascent profession by introducing 4th class certificates and imposing more clerical work upon the teacher (12). And by breaking faith with teachers over their pension rights, the government made it clear for the first of many times that it did not consider teachers a force to reckon with. What is nowadays called the "public image" of the schoolmaster could not but suffer from the underlying attitude of the Revised Code towards him: that of distrust. The whole idea of payments by results shows distrust of his conscientiousness and possibly competence; while of the distrust of his character paragraph 81c of the Code speaks volumes: "In mixed schools . . . female pupil-teachers may receive instruction out of school hours from the master, on condition that the mistress be invariably present during the whole time that the lessons are being given by the master, who must be husband, father, son or brother of the mistress, and not both young and unmarried." He deserved better, and with the passing of Forster's Education Act in 1870 and the foundation of the N.U.E.T. in the same year, he could begin to hope and strive for something better.

NOTES AND REFERENCES

1. Sir William Curtis (1752-1829) is credited with the authorship of this phrase, *A New English Dictionary on Historical Principles* (Oxford U.P., 1910).
2. The centenary of the Revised Code is, by a curious coincidence, also the bicentenary of the publication of Rousseau's *Emile* with its very different philosophy of education.

3. HMI's and—inevitably—assistant HMI's conducted the examinations in six standards. In its original version the Code had envisaged four age groups of examinees, the youngest being 3-7! The standard grant per child was 12/-, of which 4/- was apportioned to satisfactory attendance, and 8/-, or 2/8 per subject, to satisfying the examiners in the 3 R's.
4. Between 1839 when the Committee of the Council on Education was established and 1860 some £5·5m. was spent by the state on aiding elementary education provided by voluntary (religious) bodies.
5. Birchenough, C., *History of Elementary Education in England and Wales* (Univ. Tut. Press).
6. See in particular his speech in the House of Commons on 13.2.1862, *Hansard*, vol. 165.
7. *Report of the Committee of Council on Education*, 1861-62, *p. xi.*
8. See Vaizey, J., *The Economics of Education*, Ch. 3 (Faber, 1962).
9. Morris, N., "An historian's view of examinations" in ed. Wiseman, S., *Examinations and English Education* (Manchester U.P., 1961).
10. Peterson, A. D. C., *A hundred years of education* (Duckworth, 1952).
11. The Revised Code, para. 77: "No teacher who has changed more than once from one school to another during the five years preceding revision can be advanced to a higher class."
12. Lowndes, G. A. N., *The Silent Social Revolution* (Oxford U.P., 1935) states that in 1886 every elementary teacher in London had to fill 171 forms in a year.

A STUDY OF CHILDREN'S WRITING ON AN ADMIRED PERSON

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1. The Sampling of Eleven Plus Essays

As part of a secondary school selection examination conducted by a South of England Local Education Authority all children present, on a day unknown to them in advance during the January of the year of their Eleven Plus entry, were set a single composition topic:

> Think of a man or woman, living or dead, whom you admire, and suppose that you have written a book about this man or woman. Write a part of the most interesting chapter from the book.

From the answer papers of the 5352 children considered for entry two random samples were taken: in Sample A the chosen characters of 2415 of the essays were noted (1); an independent sample for more intensive analysis, Sample B, comprising the essays of 354 pupils (174 boys, 180 girls) was made up of complete results from ten schools and from partial sampling of six schools for each sex (2). The results of a National Foundation of Educational Research Verbal Reasoning Test were made available in respect to the latter sample.

2. Local and Remote Choices

In Table 1 the Sample A choices by boys and girls are classified as to sex of characters according to whether they were "local" such as relatives, neighbours, teachers; or were "remote" characters, past or present. Reference to the table will show that "remote" greatly outnumbered "local" choices: for boys and girls respectively 83·4% and 79·1% were of "remote" people. Similarly, in Sample B the corresponding proportions were 87·3% and 78·0%. For the boys, but not for the girls, of the latter sample there was a tendency towards an association of higher intelligence with a greater proportion of "remote" choices (3).

3. ATTRIBUTES AND ROLES OF CHOSEN CHARACTERS

(a) *Tendencies applying to both sexes*

(*i*) *Similarity in sex.* In the choice of local characters both boys and girls tended to prefer those of the same sex as themselves: in support of this tendency corrected chi-squares, with expected frequences regarded as equal, were, for boys and girls respectively, on Sample B results, 7·580 (4) and 6·250, significant for the one degree of freedom at respectively the 0·01 and 0·02 levels, and, on Sample A results as shown in Table 1, for cases where sex of choices had been recorded, i.e. for relatives other than cousins, 21·368 and 5·007, significant for the one degree of freedom at respectively the 0·01 and 0·05 levels.

TABLE 1

ANALYSIS OF CHOICES IN SAMPLE A: LOCAL AND REMOTE CHARACTERS

Categories	*Choices by Boys*				*Choices by Girls*				*Totals*
	Chrs	*M*	*F*	*Total*	*Chrs*	*M*	*F*	*Total*	
Remote									
Religious	20	71	39	110	21	103	108	211	321
Humanitarian	6	8	23	31	8	17	168	185	216
Royalty	19	45	12	57	18	23	65	88	145
War and Politics:									
Pre-World War II	28	208	6	214	14	55	8	63	277
Since 1939	10	72	—	72	7	15	—	15	87
Explorers	20	183	—	183	9	63	—	63	246
Science and Invention	25	63	1	64	12	30	13	43	107
Authors	7	13	2	15	18	36	13	49	64
Fictitious	15	107	1	108	14	26	9	35	143
Entertainers: cinema, TV, etc.	34	101	2	103	30	88	13	101	204
Music and Ballet	6	7	—	7	9	10	25	35	42
Sport	26	66	2	68	3	2	12	14	82
Other Remote	10	6	6	12	11	8	10	18	30
Totals—Remote	226	950	94	1044	174	476	444	920	1964
Local:									
Parent		29	4	33		12	21	33	66
Grandparent		25	16	41		22	27	49	90
Uncle/Aunt		29	12	41		18	29	47	88
Sibling		1	1	2		2	4	6	8
Sub-totals (near relatives)		84	33	117		54	81	135	252
Cousin		?	?	1		?	?	1	2
Other Local		?	?	90		?	?	107	197
Totals—Local				208				243	451
Totals				1252				1163	2415

Note on Table 1: "Chrs" = different (remote) characters chosen; "M" and "F" refer to frequency of choice of respectively male and female characters; these frequencies are summed in the column totals.

In the remote choices, however, while this tendency was maintained for the boys, it was not for the girls. Though in Sample B 57·8% of girls' total remote choices were of female characters (74 such choices as against 54 of remote male characters), in the larger Sample A, as may be derived from Table 1, slightly less (48·3%) of the girls' total remote choices were for female as compared with male characters. For boys, on the other hand, on Sample B, 90·8% (119 as against 12 female characters) and, on Sample A, as derived from the figures shown in Table 1, 91·0% of total remote choices were of male characters; corresponding corrected chi-squares, with theoretical expectations regarded as equal, amount respectively to 129·008 and 700·216, both with a P of 0·01 for the 1df.

(*ii*) *Success and recognition.* In the analysis of the Sample B essays outcomes as they affected the chosen character were rated on a five-point scale ranging from "considerable success or recognition" (="1") to "considerable failure or lack of recognition" (="5"). With the omission of the "3" ratings which were largely due to lack of action in the essay or failure to complete it in time, combined "1" and "2" ratings as against combined "4" and "5" ratings referred respectively to 64·9% (i.e. 113) as against 1·7% (i.e. 3) of boys' essays and to 50·0% (90) as against 1·7% (3) of girls' essays. Thus success and recognition of the chosen character as contrasted with lack of both was an important feature of the essays.

(*iii*) *Possessions.* As a negative finding of the Sample B analysis references to items of wealth were infrequent: only 6 (3·4%) of the boys made references to valued possessions and only 7 (3·9%) of the girls of whom 3 referred to clothing.

(*b*) *Tendencies towards sex differentiation*

Reference to the classification of Sample A choices in Table 1 will show that as contrasted with the opposite sex there was a preponderance of, e.g., Humanitarian and Religious choices by girls and of choices relating to War and Politics, Explorers and Sport by boys. An analysis of Sample B. essays provides further evidence on tendencies towards differentiation between the sexes:

(*i*) *Interpersonal situations: giving or receiving help or affection.* Of the interpersonal situations the most frequently noted concerned the giving and receiving of help or affection by the admired character: such giving was noted in 29 (16·7%) of the boys' and 69 (38·3%) of the girls' essays and its receiving in 8 (4·6%) of the boys' and 33 (18·3%) of the girls' essays. By comparing the frequencies where such giving of affection was, and was not, noted in boys' as compared with girls' essays a corrected chi-square is obtained of 19·678 with a P of 0·01 for the 1df. A similarly obtained chi-square of 14·987 for the receiving or not of help or affection by the admired character also shows a significant predominance in girls' essays at the 0·01 level for the 1df.

Though the number of boys was less than the number of girls who attributed behaviour of this kind to their favoured characters, such behaviour was not necessarily less important to these relatively fewer boys as may be instanced in the essay by a boy (standardised verbal reasoning score: 93) about a neighbour, Mrs X, who "is nice and gentall" to his friend David whose mother "doesn't want him": on Saturday afteroons, "I go to see Mrs X and take some cowboys books for David and I do some shopping for Mrs X. . . . David likes me and I like David and Mrs X. Mrs X is nearly become my mother."

In this instance, as in a number of cases, the admired person both gave and received help and affection as might be expected on the views of, for example, Suttie (5), a point which may be further exemplified in a girl's essay on Elizabeth Fry whose helping and teaching men, women and children elicited the comment: "All the prisoners loved her. . . . We all admire the love of Elizabeth Fry to the prisoners."

(*ii*) *Interpersonal situations: leadership.* Explicit leadership situations might take the form of exerting control over existing followers as in that of Nelson or King Alfred during battle or when the Israelites "with Moses at their head" continued "safely" on their journey to the Promised Land; or the process might be rather that of securing followers as in accounts of Amos—"Soon all the city came to listen to him"—and St. Patrick. Though there were many more cases of an implicit leadership-follower relationship, an explicit stress on this relationship was noted in 24 (13·8%) of the boys' essays and 5 (2·8%) of the girls'.

(*iii*) *The physical threat to security: danger.* Exposure to danger was experienced by 90 (51·7%) of the boys' and 43 (23·9%) of the girls' chosen characters. The danger might be that involved in fighting as in 68 of the boys' cases but only 8 of the girls' or dangers such as that to which the missionary, Gladys Aylward, was exposed. Explicit references to courage were made by 21 boys and 12 girls. However, the percentages of boys and of girls who wrote of situations involving accident, severe illness or death to the admired person were closely similar: 15·5% of the boys and 15·6% of the girls.

(*iv*) *Abilities*. Of the boys 24 (13·8%), and of the girls 13 (7·2%) made admiring references to ability: of these, 14 of the boys as against 2 of the girls referred to sporting ability; 7 of the girls as against 1 of the boys referred to skill in music or ballet.

4. Reasons for the Choice of Characters

(*a*) *School or other local influences*

Though the children were asked to write about someone they admired they are likely to have been influenced by the desire to give a socially acceptable answer in a school setting so that they might frequently have written about somebody who, of little interest to themselves, had been dealt with in class and therefore evidently was considered by the teachers to be worthy of regard.

School or other local influence among Sample B choices was apparent in that from one school 34 pupils (16 boys, 18 girls) made religious choices spread over 8 characters as against 74 who made secular choices in contrast to corresponding totals for the remaining schools of the sample of 24 as against 222; the resulting corrected chi-square of 24·295 is significant for the 1df at the 0·01 level. Such a result does not necessarily reflect merely social desirability in a particular school setting: of the 34 children who made religious choices in this school, 22 were considered to show explicit evidence of admiration or identification which may be largely attributed to school or other community influences fostering the patterning of values in the direction of admiration. Further, in all the ten complete school results there was a sufficiently wide choice of characters to indicate discrimination in choice: even in the school where the significant local influence has been indicated the proportions, lowest of all schools, were those of 20 and 12 different remote choices respectively among the 54 boys and 54 girls.

(*b*) *The extent of admiration and identification disclosed*

Admiration as judged by remarks of praise, and identification as judged by evidence that the child was entering into the thoughts and feelings of the character, were apparent in varying degrees. Occasionally, in the same essay, the recipient of admiration appeared to be different from a character eliciting identification, as in an apparent distinction between a girl's admiration for Christ and identification with Mary or a boy's admiration for an author and identification with one of his heroes. Occasionally, too, apparently a switch of identification as between William Tell and his son might occur, or identification with a group, e.g. with the British in an account of Nelson. Where neither admiration nor identification were revealed a favourable attitude such as liking was at times apparent but in other cases the account was emotionally neutral or occasionally irrelevant.

Ratings tended to show that many pupils were influenced not merely by acceptability in a school setting but by genuine admiration and identification: 57·6% of the essays were judged to reveal identification, 44·0% admiration and 67·8% the one, the other or both. A relatively greater number of girls' answers (66·1%) than those of the boys (48·9%) were assessed as disclosing identification; admiration ratings, 46·1% and 42·0% respectively, showed less difference between the sexes.

5. Exemplification of Remote Choices

The two most frequent Sample A choices of "remote" characters, Gladys Aylward and Florence Nightingale, each the topic of 130 essays (36 and 17 boys' and 94 and 113 girls' respectively) were both classified, as shown in Table 1, in categories most favoured by the girls, Religious and Humanitarian respectively. The Religious choice, Christ, the topic of 83 essays (29 boys', 54 girls') was the fifth most frequently chosen topic while a further Humanitarian choice, Elizabeth Fry, the topic of 54 essays (5 boys' and 49 girls'), was in seventh place. The remaining four of the eight most highly ranking choices for Sample A were in categories chiefly favoured by the boys: Nelson (War and Politics) in third place as the topic of 98 boys' and 15 girls' essays, Robin Hood (Fiction—including legend) in fourth place as the topic of 71 boys' and 13 girls' essays; in sixth and eighth ranking the explorers, Francis Drake and James Cook, with respectively 56 (43 boys' and 13 girls') and 46 (29 boys' and 17 girls') choices. In ninth place, the Queen, Elizabeth II, the leading choice of the Royalty category was the topic of 6 boys' and 38 girls' essays. Of the remaining seven characters chosen 25 or more times, five, Winston Churchill, Marco Polo, David Livingstone, Captain R. F. Scott and William Tell, were mainly boys' choices; the remaining two showed a negligible sex differentiation: the "Western" actor, Robert Horton and the entertainer, Tommy Steele, were the topics of respectively 16 and 12 boys' and 20 and 17 girls' essays.

The smaller Sample B was in accord with Sample A to the extent that the first eight places were filled by already mentioned names chosen in the following rank order: Gladys Aylward (27 choices), Nelson (18 choices), Marco Polo (15 choices), Florence Nightingale (13 choices), William Tell, Christ and Robert Horton, Robin Hood.

From an analysis of the Sample B accounts of the four most frequently chosen characters (of whom two were the boys' and the other two the girls' favourite choices) in the larger sample, considerable similarity was found in essays on the same character in the cases of Gladys Aylward, Florence Nightingale, and Nelson, but the Robin Hood essays each related different episodes (6).

References to the film, "The Inn of the Sixth Happiness", concerning the life of Gladys Aylward, indicated that a number of the children had seen this film which had been shown in the district the preceding year. The essays described how, having resolved to become a missionary, she had to surmount obstacles such as her need for money for the trip to China, her failing a needed examination, and escape from capture on her journey there. On her arrival she underwent distressing incidents such as having stones and mud thrown at her, being called a foreign or white devil and witnessing the execution of a Chinese; in her distress she was comforted by an older woman missionary. An inn was set up where her stories, referred to as being religious, aroused interest. Help was given by her to the Chinese, particularly to women and children, in a war. Thus after encountering initial obstacles and hostility she became successful and accepted; she gave help and in return received support from the older missionary and eventually acceptance by the Chinese. In the ratings of these essays identification rather than admiration predominated: the children would appear to have been so involved in the story that they had little occasion to stand aside and appraise. Here was someone manifesting important human needs that the children shared and like themselves undergoing everyday difficulties such as lack of money, failure in examinations, hostile actions and remarks.

Ratings for the remaining three most favoured characters tended towards a combination of admiration with identification. The accounts of Florence Nightingale, after frequently referring to youthful experience such as bandaging dolls and conflict with parents over the desire to become a nurse, dealt with caring for the sick, comforting soldiers, the bad conditions in hospitals and what she did to improve them; reference was also made to appreciation by soldiers and others. All the Nelson essays dealt with fighting: the majority concentrated on a traditional account of the battle of Trafalgar with mention of such items as refusal to remove the medals which made him conspicuous, and the doing of one's duty. All but one of the Robin Hood essays involved an experience of success for him in his getting the better of others; there was a tendency to emphasise a leadership situation, explicit or implied; robbery occurred in a socially approved framework of combating ill-gotten wealth and the wickedness of Prince John.

6. Exemplification of Local Choices

Classes of relatives selected as topics in Sample A are shown in Table 1 where the further category, "Other Local", includes 30 teachers who were chosen as topics by 6 boys and 24 girls. Should these numbers seem not great, they are merely typical of the tendency to choose from the remote rather than the local environment as is emphasised by the fact that the person probably closest to children generally, the mother, was the topic of only 25 essays. In Sample B only two teachers were selected: a girl wrote about her "very good ballet teacher" who, before going to hospital, had been "in pain for about 6 months but she still taught ballet lessons" and for whom she bought five shillings' worth of flowers from her money box; a boy (std. verbal reasoning: 87) wrote about Miss N who "is a nice teacher I admire her because she can play the recorder so well. When she is wrighting music she wrights it so gracefully and when she plays her violin she plays it so nicely."

A distinctive tendency in local choices was the relationship of the writer to the chosen character as exemplified earlier for a boy (under 3(*b*)(*i*)) and for a girl (std. verbal reasoning: 106) who wrote of a neighbouring housewife who had supplied meals when her mother was ill:

> she would always save me things like silver paper, tea cards and lot more things. . . . Sometimes I go down the shop for her but I never take any money from her if she offers some to me. . . . If I see her milk left out I always take it into her for I am always willing to do something for her for her kindness to me.

Or the special relationship might be with a relative as in a boy's pride in his grandfather, formerly a boxer, who won many fights and cups and who was going to give his gloves to the boy and his brother. Again, a girl wrote of her father whom "I love and admire above all people" and who after applying unsuccessfully for two jobs secured a third which was "better than the other two put together": he gave me an "affectionate hug" and "I thought what a lucky child I was to have such a marvelous father".

7. Discussion and Conclusions

The impact made by acquaintance with people as studied in this article is of educational importance not only since education should involve as a central aim the acquainting with, and understanding of, people but also since admiration and identification with "heroes" may be postulated both to reflect and to be helpful in the building of values and of a concept of the ideal self. The fact that the answers were written in a school setting should be allowed for, but though social desirability may have influenced the results, the pressure to decide on a topic quickly and to write without much time for reflection in the allocated thirty-five minutes may well have countered this influence to some extent. Though no doubt varying, a considerable degree of motivation would be expected to have been involved.

Of educational relevance are the results relating to the needs revealed as important (7) and the sex differentiation in some of their manifestations as in the significantly greater degree of the giving and receiving of help and affection in regard to girls' choices. In such sex differentiation there was, however, a considerable overlap in spite of the traditional cultural pressures demarcating different fields of endeavour as appropriate to men and women. Moreover, basically the same need might find outlet in different culturally patterned ways: for example, the need for adventure by more girls than boys through Gladys Aylward and by relatively more boys through Robin Hood. Nevertheless, the differences of choice as between boys and girls do have educational implications: adequate provision of potential heroes and heroines of like sex to the pupils and according to differing appeals as between the two sexes is indicated; but it may also be suggested that the influence of education need not be used to accentuate unduly sex differentiation but that rather a wide range of both male and female characters in diverse fields of human endeavour be presented to both boys and girls with the aim of promoting broad sympathies.

In conclusion, an analysis of the choosing by children around eleven years of admired characters for a task in a school setting revealed the following features:

1. Remote as compared with local choices predominated.
2. In both sexes local choices tended significantly to be of characters of the same sex as the pupil; for remote choices this tendency in the case of the boys was increased to over ninety per cent in both samples but in the case of the girls declined to approximate equality between male amd female choices.

3. The importance of certain basic needs was manifested in the behaviour and events associated with favoured characters: in particular, recognition and success and, though significantly showing sex differentiation, the giving and receiving of help and affection.

4. Sex differentiation of choice according to cultural patterns occurred as exemplified by relatively greater numbers among girls of humanitarian and religious choices and among boys of choices of characters associated with war and politics, explorers and sport.

5. On the definitions used, considerable admiration and/or identification was judged to occur: 67·8% of the essays were judged to show the one, the other or both.

6. Besides apparent exemplifying of a film influence (concerning Gladys Aylward), a significant instance of an association of a school with type of choice was evident.

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1. Work done by Dr W. H. King of the London Institute of Education.
2. Bray, D. H., *A Study of Personal Attributes and Roles Favoured by Boys and Girls Aged Eleven to Thirteen Years* (unpublished Ph.D. Thesis, University of London, 1961).
3. With a classification according to a verbal reasoning standardised score of 106 and more as against the rest the association for boys' remote as against local choices gave a corrected chi-square of 4·710 (P =0·05 for the 1df). In this chi-square there was one observed frequency of 3 but no expected value fell below that for this cell, 7·85. No other observed or expected frequency in the chi-squares reported in this article fell below 5 apart from one observed frequency, also of 3, in the chi-square noted as note 4.
4. See note 3 above.
5. Suttie, I. D., *The Origins of Love and Hate* (London: Kegan Paul, 1935).
6. For frequency of items see Bray, op. cit., pp. 215-22; e.g. from the 27 Gladys Aylward essays: saving of money—18 essays; stones and/or mud thrown at her—17 essays.
7. cf. Fleming, C. M., *Teaching: A Psychological Analysis* (London: Methuen, 1958), pp. 31-37.

THE RELATIONSHIP BETWEEN MALADJUSTMENT AND BACKWARDNESS

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1. INTRODUCTION

ALTHOUGH there has been an increased interest in recent years in both backward and maladjusted children, our understanding of the association of emotional factors with learning difficulties is still very limited. Laboratory studies of learning as well as clinical studies of maladjusted children are gradually contributing to our knowledge, but we need more studies of large numbers of children in "ordinary" schools, of children in special schools, and, in particular, of the successes and failures of teachers who are actually dealing with pupils who are dually handicapped by both learning and emotional difficulties. Apart from its theoretical interest, there are several practical problems the solution of which depends on our knowledge of the relationship between maladjustment and backwardness. Educational administrators are already considering whether children who are backward and maladjusted need a special type of provision; teachers are experimenting to discover what kinds of approach are most effective in remedial work; and those concerned with the planning of training courses are wondering whether there should be separate courses for teachers of backward children, the maladjusted, the physically handicapped and so on, or whether a common course is appropriate.

Four questions are of practical as well as theoretical interest:

(1) What proportion of children are both backward and maladjusted?

(2) To what extent is maladjustment the cause, and to what extent is it the effect, of backwardness?

(3) What is the relationship between specific types of maladjustment and educational backwardness?

(4) What kinds of educational provision and teaching methods are most appropriate in treating children who are both backward and maladjusted?

2. Research Difficulties

Quite apart from the number of variables involved, several difficulties face the research worker who attempts to answer these questions. An initial difficulty is that terms such as "backwardness", "maladjustment", "anxiety" are used in many different senses. In this article the term "maladjustment" is used to cover all forms of social or emotional disturbance in children, and "backwardness" to include those children who, irrespective of IQ, need special educational treatment of some kind because of failure in school work.

The recent realisation that a score on an intelligence test may be depressed by the same factors as scores on attainment tests, and that "mental age" and "attainment age" should not be directly compared, has made it difficult to estimate the role of "low general ability" in the causation of backwardness. In other words, we now recognise that a child may appear to be dull because of emotional disturbance.

Many studies tend to treat maladjustment as a static concept and thus evade another difficulty. Maladjustment is rarely either a permanent or a consistent state of affairs. While some children are disturbed in all situations, most are disturbed in only some situations. Furthermore, it is surely unjustifiable to regard a child's attainment as wholly related to his present level of disturbance. We want to know to what extent the child's backwardness is related to previous disturbance, particularly at "critical periods" and perhaps most of all during the infant school period. Previous disturbance is even more difficult to assess than present.

Finally, there is a lack of reliable tools for the assessment of "maladjustment". The Bristol Adjustment Guides are valuable for use with teachers, but we need better instruments for discovering more about children's feelings from the children themselves. Written questionnaires have their uses, but in work with backward children, for instance, the inability to read and understand questionnaires is an important factor which may distort the results if not taken into account.

3. The size of the Problem

We know little about the size of the problem. We do not know either how many of those children who are ascertained and treated primarily as ESN (in the widest sense) also show symptoms of maladjustment, or how many of those children who are in classes and schools for the maladjusted have serious learning difficulties. In fact, we know comparatively little about the incidence of maladjustment, and much less about the incidence of backwardness in arithmetic and spelling than we do in the case of reading. Estimates of the incidence of maladjustment range from 1% (Ministry of Education); 5% (Scottish Education Department); nearly 12% (Somerset); and 40% (Tyneside studies)—with some American studies even higher. Estimates of the incidence of *all-round* educational backwardness range from 5 to 15%, and recent surveys show that about 20% are backward in reading. We know little about the number of children who have specific learning difficulties in spelling or arithmetic.

If we know little about the incidence of maladjustment and backwardness separately, we know less about the overlap between the two. Burt has estimated that about three-quarters of backward children are maladjusted in varying degrees, while about one third of maladjusted children appear to be backward.

There have been a number of studies of the adjustment of backward readers. Gates (1941), for example, found that 75% of children with a severe disability in reading were maladjusted, but these children were referred to clinics, and, as Vernon points out, therefore specially selected: clinical groups tend to show more maladjustment than studies of large school groups. Kellmer Pringle (1958), in her study of deprived children, found 81% of the backward readers to be maladjusted, as compared with 60% in her total sample.

With regard to the attainments of the maladjusted, there seems to be little recent work even on referrals to clinics and children in schools for the maladjusted. The writer tested the attainments of 25 boys on admission to a residential school for maladjusted boys in Liverpool, and found that 15 needed special attention for backwardness, all-round in 9 cases, reading in 4 cases, arithmetic in 2. The mean IQ of these boys (av. age 11.3) was 93, the mean RQ 83 and the mean Arith Q 83. It would be interesting to know to what extent this is a typical picture.

Finally, to refer to one of the rare surveys that has been carried out relating attainment to maladjustment, Crawford (1961) found that few children who made high scores on the Stott guide were doing well at school.

The evidence thus points to a considerable overlap between backwardness and maladjustment, but we need many further studies of their incidence in different areas.

4. Maladjustment: Cause or Effect

Many studies, while recognising that maladjustment can be a cause or the effect of backwardness, have either failed to differentiate in this respect, or found it difficult to do so. Schonell (1942) mentions in his list of causes of backwardness in word recognition that in nearly 43% of cases there were "adverse emotional attitudes". Are these really causes, or rather features present in cases of backwardness?

We know that maladjustment can be the primary cause of failure to learn. In the case of over-protected children, Durning (1948), in an intensive study of a small group, found that the results of over-dependence were scholastic backwardness both in reading and arithmetic, speech disorders and lack of confidence and assurance. Deprived children, too, often become maladjusted as a result of separation from home and find learning difficult. A number of studies have stressed that instability can cause serious backwardness in arithmetic while not impeding progress in reading to such an extent.

Most workers, however, emphasise that maladjustment is more often the result than the cause of backwardness, and that, in many cases, frustration, anxiety and inferiority are secondary to school failure. Fernald (1943) found that the majority of her cases of reading disability who showed symptoms of maladjustment had developed these as a result of failure to learn to read. It appears that emotional difficulties often start at the time when the child transfers from the infant to the junior school without having made much formal educational progress. It is at this stage that the anxiety of the parents is added to the growing awareness of failure in the child. However, the writer has noticed an absence of symptoms of serious maladjustment in many cases of school failure, and has found social and emotional immaturity to be more often associated with backwardness than maladjustment, even among children of normal and above-normal intelligence. It is interesting that Crawford found that, on Stott's Guides, duller children may appear unsettled or maladjusted because their behaviour is appropriate to their mental age rather than to their chronological age.

To sum up, even if maladjustment is a cause of backwardness, the learning difficulties themselves add to the child's emotional troubles. As Kellmer Pringle (1958) puts it in the case of deprived children, "... maladjustment militates against successful learning; unsuccessful learning results in a sense of failure and frustration, thus further increasing the likelihood, and possibly also the degree of maladjustment".

We certainly need more research into the early history of children who have learning difficulties, and better still, because retrospective studies are so unreliable, longitudinal studies of children from the time they start school.

5. SPECIFIC MALADJUSTMENT AND BACKWARDNESS

Vernon (1957) sums up the literature relating to specific kinds of maladjustment and educational backwardness by stating that there is no very conclusive evidence that backwardness in reading is associated with any particular type of personality defect or emotional disturbance. Biggs (1959), reviewing the literature on arithmetic, states, "Instability and maladjustment are difficult and complex variables and it is difficult to conclude . . . anything further than the simple fact that children who are emotionally disturbed would be expected to show up poorly in arithmetic."

If we omit any consideration of unconscious factors which produce barriers to learning, there seem to be four main groups of children in whose case there is a link between maladjustment and backwardness.

(a) *Anxiety*

There are the children whose ability to learn is impaired by anxiety. We know that some children fail to learn because they are not anxious enough about learning; but there are also those who are so anxious about their personal problems that they are unable to concentrate in class on other things, and those who are so tense that they are unable to think clearly about anything. In both cases anxiety may interfere with normal sleeping, eating, etc., and produce an over-tired child.

Although laboratory experiments show that anxiety is more likely to interfere with the learning of complex material than with the mastery of simple tasks, it is more likely to prevent a child from making a start to learning than from making some further progress once the foundations of the basic subjects have been laid. Wright (1959) and Hamza (1952) have drawn attention to the rôle of the school in evoking anxiety in some children, particularly in the case of timid, introverted children whose attainments may suffer as a result. Other studies (e.g. Fishburn, 1959) have suggested that anxiety may have a greater effect on attainment in the case of more intelligent children.

There is still considerable controversy about the relationship between anxiety and attainment. School phobics—mainly anxious children—have been reported as having, almost invariably, good scholastic attainments. In a study of 33 cases, however, the writer found 13 cases where there was a marked degree of educational retardation (9 with little reading ability, 4 very backward in number), although the majority of the children were of average or superior intelligence. There was no significant disparity between the attainment levels in reading and arithmetic in the group as a whole, though Lynn (1957) has put forward the hypothesis that anxious children tend to be better at reading than at arithmetic.

(*b*) *Social Maladjustment*

There are also the children whose backwardness seems related mainly to an inability to conform to the social requirements of school life. They spend a lot of their time in class being aggressive to others; or, through acts of delinquency, they become unpopular with the teacher and often with many of their peers, and are unsettled in school. They come to dislike school, and perhaps miss a great deal of schooling through truancy or spending time in juvenile courts and remand homes. Of these children, delinquents have been studied as a group, if a very heterogeneous one. Although only slightly below the general norm in intelligence, they show a considerable amount of educational backwardness. Gittins (1952) in his study of approved school boys found the "great majority of his boys to be backward all-round; by general standards their retardation was greatest in arithmetic, less in spelling, and least of all in reading". Delinquents tend to suffer emotional stress in connexion with school, and in some cases delinquency seems to be a compensation for failure at school.

(*c*) *Brain Damage*

In some children, far fewer in number than the previous groups, both maladjustment and learning difficulties are related to brain damage. The personality picture is often one of erratic, hyperkinetic, impulsive and aggressive behaviour. The main feature on the intellectual side is an inability to think in abstract terms and a difficulty in learning new things, though previous learning is often retained in the case of children who suffer brain damage after learning is established. There is a generalised lack of concentration due to anomalies of perception and attention, and a tendency to get lost in details of reading and number instead of grasping concepts as a whole. Brain damaged children seem to have greater difficulty with number than reading.

In her studies of cerebral palsied children Cockburn (1960) has found that severe handicap, low intelligence, poor attainment and poor adjustment tend to go together and to reinforce one another.

(*d*) *Schizoid Children*

Finally, there is the group of "schizoid" children, also few in number. Although the intellectual functioning of these children is often grossly disturbed, there is little work on the scholastic attainments of this group. The main finding is an uneven pattern of attainment in the individual child, with some accomplishments above and some very much below the norm for the age. The writer has found psychotic children to have particular difficulty with number, though they often read well; but he has also found that some of these children do surprisingly well at school. One autistic, almost mute, boy of high intelligence hardly uttered a word or made a social contact during his primary school career, but did well enough in school to pass the 11+, and developed a passionate interest in number.

To sum up, all four groups seem to have greater difficulty with arithmetic than reading. Yet it is backwardness in reading which causes more concern to children and parents, as well as to teachers and psychologists.

6. TEACHING AND TREATMENT

Finally, what kinds of teaching and treatment facilities are needed to deal with the problem? Firstly, it needs to be stressed that the teacher of any group of handicapped children will be called upon to deal with a combination of handicaps rather than one handicap alone. Training courses must accept the implications of this, as there are teachers in ESN schools who think that dealing with maladjusted children is outside their province. Similarly, in schools dealing with maladjusted and delinquent children, backward children do not always get the expert teaching in the basic subjects that they need.

Secondly, with regard to teaching methods, controlled experiments are needed along the lines of the Glasgow Child Guidance Service's investigation into methods and organisation in the treatment of the slow-learning child (1953-1955). Three methods of treating children with the milder emotional difficulties associated with backwardness were compared (severely maladjusted children were excluded): activity methods in the class situation, tutorial classes using more formal methods, and methods combining psychotherapy with teaching at a Child Guidance Clinic. It was found that progress in reading and arithmetic was least in the activity classes, though many of the children improved in personality and in attitude towards school work.

In the tutorial classes, the emphasis was on learning difficulties rather than on personal problems, but progress in reading was almost as great as among the clinic cases and in arithmetic was greater; these children were the ones who benefited most from the experiment. . . . "Educational progress did not always follow from release of personality either through clinical treatment or through expressive activity. There appears to be a strong habit factor, particularly noticeable in the learning of arithmetic, which requires more recognition in modern teaching."

The experiment points to the need for those concerned with remedial education to consider the rationale and efficacy of their methods.

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INTELLIGENCE TESTING OF THE CEREBRAL PALSIED

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So much controversy has been found in the literature relative to the cerebral palsied, and so much doubt has been expressed by workers in the field regarding intelligence testing, as to justify setting forth some conclusions. These derive from the psychological study of 223 cerebral palsied persons aged from birth to 21 years, in three of the Eastern counties of Scotland, Dundee being the centre. This work was carried on from 1954 to 1957 and the aim was to study the entire cerebral palsied population under 21. The incidence found (two per thousand) was higher than that generally accepted in this country, and, since a small percentage was omitted owing to non-co-operation, it would suggest that the numbers are very comprehensive.

There are four main arguments about testing; first, that intelligence tests should not be used with the cerebral palsied; secondly, that special tests are required; thirdly, that the recognised tests should be specially modified; and, lastly, that the recognised tests should be used in standard form. These will be dealt with in turn.

First, it has been argued that, because of the nature of the handicap, intelligence testing is not applicable to the cerebral palsied. One parent of a cerebral palsied child writes of "the hideous injustice" of intelligence testing for such children, with the same emotion as the indignant parent who decries it as a means of denying his child certain educational rights at eleven plus. Since, however, decisions as to appropriate provision and education have to be made, and since even a trial and error method demands a decision as to appropriate *initial* placing, the only alternative is to use a subjective and impressionist method. All the obstacles which the cerebral palsied present to testing, such as impairments of manipulation and speech, remain as obstacles to subjective assessment, and a few more are added, namely, those arising from abnormal appearance and manner. Experience on the survey, where rough estimates of mental status were generally available prior to testing, revealed the subjective method as being by no means satisfactory, and revealed also that errors occurred in both directions, under-estimation being found as well as over-estimation.

Secondly, it has been suggested that special tests should be devised to measure the intelligence of the cerebral palsied. Cerebral palsy is a communication handicap, which in all but a few cases causes some degree of impairment of the hands and sometimes an additional impairment of speech. Apart possibly from some types of developmental schedule, intelligence testing demands some form of direct response and all lines of response, speech, manipulation, even gesture, may be impaired by cerebral palsy. So that while special tests might be designed to eliminate the effect of handicap for some sections of the cerebral palsied, it is extremely unlikely that special tests could be constructed which would be applicable to the entire cerebral palsied population. Some, who advocate special tests for the cerebral palsied, go so far as to suggest that special norms also be compiled. Their value would be very doubtful. The relative standing of one cerebral palsied person to another is comparatively unimportant, since all live in a normal and not a cerebral palsied society.

The third line of argument has received most support. It runs as follows; that to be fair to the cerebral palsied, tests should be adapted and modified in ways necessary to discount the handicap. Various adaptations have been tried, such as altering the size of performance material, dispensing with timing, substituting multiple choice items for direct questions, permitting the signifying of what requires to be done rather than actually carrying it out. Indeed considerable enthusiasm has been evinced for modifying tests. One medical writer, Tizard (1), comments on how valuable it is to have a psychologist trained to make adaptations in testing cerebral palsied children. Cruikshank (2), after pointing out that some require no test modifications, goes on to suggest possible ways for those who do, including accepting pantomine responses to Binet Absurdities. This, he points out, is much more difficult than giving a verbal response. It is interesting to speculate on a satisfactory pantomime response to: "The fireman hurried to the burning house, got his fire-hose ready, and after smoking a cigarette began to put out the fire", to say nothing of the redoubtable Bill Jones whose outsize feet resulted in odd sartorial habits.

Such arbitrary modification of intelligence tests is an attempt to make allowances for individual handicap by adjusting the yardstick. This, however, would seem to imply a fundamental misconception of intelligence testing. The great aim and advantage of the intelligence test is that by the use of standardised material and procedures an objective measurement is obtained. By its very nature the intelligence test cannot therefore be susceptible to this type of modification.

Fourthly and finally, it is argued that the recognised tests can profitably be used with the cerebral palsied, and that they should be administered in standardised form. In this case, every item in which the cerebral palsied person does not succeed, is scored as a failure whether this failure be due to lack of intelligence or any other inadequacy. Rigid application of standardised procedure and scoring, as was used in the Dundee survey, appears to make less difference to the resultant scores than might be supposed. Results of recent surveys corroborate one another well, and despite making no allowances for handicap, the Dundee figures show a higher number of top category scorers than reported by Dunsdon (3), Schonell (4), or by the New Jersey Survey of 1951 (5). Adherence to standard procedure does not preclude making modifications once the item has been scored. In this way, useful supplementary information can be obtained for the really important problem of interpreting test results for all who will use them. In such interpretation the purpose of testing should be kept in the forefront. If there is any possibility of the person tested taking a normal place in society, the comparison with the normal child assumes more importance. If special provision is obviously required the comparison with the normal is still needed, but reactions to modified situations are all the more interesting.

TABLE 1

SPEECH

Speech	*Normal*	*Slightly Defective*	*Very Defective*	*Nil*	*Total*
No.	125	38	18	42	223

Many real difficulties can beset testing the cerebral palsied. Generally instanced are: difficulties of response arising from impaired speech and manipulation, difficulties of vision, hearing and perceptual anomalies, emotional instability, lack of normal experience. Such difficulties are generally cited as if all were applicable to the entire group, but this was by no means the finding of the Dundee survey. Efficiency in speech is shown in Table 1. Those with normal or slightly defective speech totalled 163 or 73% of the group, and none of these presented any problem for testing as regards speech. Even the 18 with intelligible but very defective speech presented less difficulty than might have been expected, provided the tester took time to become acquainted with the speech, and was very familiar with the test and the answers likely to be encountered. Further analysis of cases without speech is given in Table 2. The majority of those with I.Q. under 50 (25 out of the 33) were of idiot grade and could be adequately tested on a developmental schedule.

TABLE 2

CASES WITHOUT SPEECH

Category	*Less than 2 years*	*Deaf*	*I.Q. under 50*	*Total*
No.	6	3	33	42

Impaired manual function was more common than defective speech as is shown in Table 3. It was found necessary to make adequate distinctions; for instance, severe manual impairment might be applied to two cases, one with one normal and one useless hand and the other with both hands severely incapacitated. Yet their efficiency was very different. A total of 179 or 80% had at least one hand which was only slightly affected and which was adequate for the use of a pencil. As Table 4 shows, even of the 44 with both hands severely impaired, nine were still able to use a pencil intelligibly. The most interesting point shown is that only two cases of school age and of I.Q. above 50 were rated as having two very severely affected hands. One had adequate speech; the other, despite having both hands severely affected and very defective speech, still scored an I.Q. of 82 on the Terman-Merrill Scale, though previously she had twice been judged "intuitively" to be severely mentally defective.

TABLE 3

USE OF HANDS

Normal	*1 Normal 1 Slight*	*Both Slight*	*1 Normal 1 Severe*	*1 Slight 1 Severe*	*2 Severe*	*Total*
32	36	46	35	30	44	223

TABLE 4

CASES WITH BOTH HANDS SEVERELY AFFECTED

Pre-School	*School Age*			*Total*
	I.Q. under 50	*I.Q. over 50*		
		Able to use pencil	*Unable to use pencil*	
4	29	9	2	44

Much stress has been laid on the difficulties of testing the cerebral palsied because of the occurrence of blindness and deafness. Of the 223, four children required to be tested as blind, all with adequate speech; and three as deaf, none of whom had intelligible speech, but all with adequate use of the hands.

As regards emotional stability all degrees were found among the 223 cases. They were rated for adjustment as shown in Table 5 with the normal child in mind as standard. The range of distinctions within the group was wide, and it is an open question whether as a group the cerebral palsied show more emotional instability than, for example, the mentally defective.

TABLE 5

EMOTIONAL ADJUSTMENT

Very Good	*Good*	*Fair*	*Poor*	*Not Applicable*	*Total*
38	77	49	56	3	223

No assessment of lack of normal experience was possible, but it should be remembered that the cerebral palsied are not in a unique position in lacking normal experience. This they share with the blind, the epileptic, the mentally defective, as well as with those handicapped socially, economically and racially. For many of the handicapped, lack of normal experience is likely to be an enduring handicap. Since, where it persists, it is also likely to have a depressing effect not only on the intelligence test score, but on the developing intelligence itself, it is very doubtful that any effort should be made to discount it. It is very obvious in studying the cerebral palsied that two tendencies are at work: the tendency for the very severely disabled, unless he can find a means of communication, to suffer from intellectual starvation, and the other tendency for good intelligence to find its own ways of circumventing the handicap.

For the purpose of intelligence testing the important consideration was the extent to which impairments, particularly of communication, occur together, or in such measure as to render testing impracticable. There were 42 without speech, and 44 with both hands severely affected. Of these, 26 were common to both categories. All 26 were also of very low grade intelligence, all in fact being of idiot level. The outstanding feature of such cases was that difficulties in physical response were far overshadowed by their almost complete lack of interest and minimal responsiveness, not only to testing, but in all aspects of their living.

One of the points which makes testing somewhat less of a problem, is the extent to which severe handicap and low intelligence occur together. Taking the medical classification of severity of cerebral palsy, the average I.Q. for each group is as given by Table 6. By far the majority of the very severely disabled are also of very low grade intelligence. It is unusual to find severe disability and even average intelligence occurring together, though the fact that three such cases were found among the 223 on the survey proves that exceptions do occur. Therefore, it is unsafe to infer degree of handicap or mental status one from the other. Testing is one of the best ways of discovering these exceptional cases and, despite the severe handicap, it readily revealed the ability of each of the three children mentioned above. It is the writer's opinion that intelligence testing is a safeguard for the cerebral palsied child, and had intelligence tests not been already available it would have been necessary to invent them for use with the handicapped.

TABLE 6

INTELLIGENCE AND SEVERITY OF CEREBRAL PALSY

Severity	*Mild*	*Moderate*	*Severe*
No.	94	80	49
Av. I.Q.	81·1	69·0	39·8

Having decided on the necessity of using intelligence tests with the cerebral palsied, a word about their worth follows. Of the Dundee cases, 35 had also been tested by the Educational Psychologist of the area, also on the Terman-Merril test. The average difference between the first and second I.Q. was six points and the Bravais-Pearson correlation between the earlier and later set of results was ·91. More results showed a fall than an increase on the second test, and this number would have been still greater had not corrections been used in the cerebral palsy survey, which had the effect of increasing I.Qs. under 50 for all over eight years of age. Since in all but one case (where the difference was 17) retesting yielded I.Qs. not more than 12 points different and generally considerably less, over an average time lapse of just over three years, the I.Q. would seem to be an extremely useful guide in allocating the cerebral palsied to suitable provision.

In conclusion, intelligence tests are, in many cases, no more difficult to administer to the cerebral palsied than to the normal child, although interpretation always requires more thought. Because there are extra uncertain factors entering into testing the handicapped, it is necessary to remain more open-minded, and to predict on a short term basis only, retesting whenever a decision has to be made and there is any reason to suspect that the child is one of the few whose I.Q. result will show substantial alteration. Psychologists appear more hesitant over I.Q. results than many others who make use of them, and therefore it is probably safer to use I.Q. categories than numerical results for individual children.

Uneasiness over testing the cerebral palsied seems to arise from the same confusion which Hebb (6) has pointed out exists in the whole field of intelligence testing, namely, between thinking on the one hand in terms of intellectual potential, and on the other, in terms of acquired intelligence. For the cerebral palsied the question is further bedevilled by the striving, not just to obtain a measure of intellectual potential, but rather of what the intellectual potential might have been had the handicap not been present. The useful measure is not this at all, but rather a measure of the intelligence that has been acquired, that can be mobilised at the moment, that gives a guide to suitable provision now, and can serve as a basis for short-term prediction.

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BOOK NOTICES

MATTHEW ARNOLD, *Democratic Education* (ed. R.H. Super; University of Michigan Press, 55s.).

A GOOD deal of this collection of Matthew Arnold's writings on education—one of two to appear in this edition of his complete prose works—is of historical interest only. The main argument of "The Popular Education of France" and of "A French Eton"—the need for State intervention in the provision of education—has long been accepted; and we who are faced with the more recondite problems of "how much?" and "for how long?", and, above all, "what?", hardly need the persuasion of Arnold's pervasive irony. One wishes, indeed, that so intelligent a man had pushed his interest in education and its results somewhat further; so that he had not rested content with such large generalities as those represented by his reference to the instinct "pushing the masses towards expansion and the fuller life" or his proposed aim for the education of the middle classes, that it should produce "largeness of soul and personal dignity". Of course, as far as he went, he was completely right—right about the need for state organisation, about the need for inspection, about the Code. He was right too, to urge the need for "humanisation"—something of what that meant one can deduce from the rest of Arnold—and the necessity of moral self-realisation in terms of the "best self":

> . . . the great end of society is the perfecting of the individual, the fullest, freest, and worthiest development of the individual's activity.
>
> ("A French Eton")

Here, indeed, one touches on a theme which is of more than historical interest. For, to Arnold, the fundamental educational dilemma of his times which he saw—though not, naturally, with the urgency it has assumed in our own day—was how, in the new democratic society, the sense of quality which the English aristocracy, whatever its faults, had provided, was to be preserved. Here lies the importance of his introduction to his survey of "Popular Education in France"—an essay which gave him a good deal of trouble to write and which the editor of this volume, Mr R. H. Super, rightly considers to be "in many ways . . . the keystone of his thinking about politics and education". The aristocracy which was then beginning to yield power was not remarkable for its quickness of intelligence or its openness to ideas; but it had been in the "grand style". A governing class imbued with such a style

> may not be capable of intelligently leading the masses of a people to the

> highest pitch of welfare for them; but it sets them an invaluable example of qualities without which no really high welfare can exist.

For the *noblesse oblige* of the aristocracy, then, Arnold hoped to substitute the light generated by the benevolent state—the Spirit of the Best Self; for the "immaterial chivalrous ideal of high descent and honour" he hoped to substitute the "immaterial modern ideal of spiritual and intellectual perfection through culture" ("A French Eton"). What was basic was the need to preserve "superiorities"; and he criticises the "dominant tendency of modern Swiss democracy", which he regards with some disquietude:

> It is socialistic, in the sense in which that word expresses a principle hostile to the interests of true society—the *elimination of superiorities*.

Education, then, to Arnold was a moral force productive of an excellence which would ensure that in the inevitable transfer of power the ninetenth century was to witness the characteristic aristocratic virtues were to be preserved—indeed, supplemented by—that openness to fresh ideas, that concern for intelligent action, which "culture" could foster. His ideal is basically that of Plato—a pursuit of the best that had been thought and said (Plato's concern for "philosophy") with the aim, ultimately, not of contemplation but of the refining of our social life, though he concedes more to the notion of *general* equality than would the Greek have done. Basically, his problem was ours:

> The difficulty for democracy is, how to find and keep high ideals. . . . Nations are not truly great solely because the individuals composing them are numerous, free, and active; but they are great when these numbers, this freedom, and this activity are employed in the service of an ideal higher than that of an ordinary man, taken by himself. Our society is probably destined to become much more democratic; who or what will give a high tone to the nation then? That is the grave question.
>
> ("Democracy")

He combines, indeed, a generous desire to see that expansion of spirit in the oppressed which a more equal state of society can bring about with a concern for the maintenance of standards in the process of activation.

It is, however, his lack of concreteness that exasperates. Though his interest in the problems of popular education quickened as his investigations proceeded (he had written to his sister on the eve of his departure to France, "You know that I have no special interest in the subject of public education", whereas we find two years later that he was willing to risk his position by opposing the "Twice-Revised Code"), he seems never even in his Reports to have asked what the actual effects of the schooling they received were on the children of the working classes. He appears to have assumed that if the "right material" was chosen, the process of humanisation inevitably followed. Here his lack of interest in educational theory proved a disadvantage; had he been stimulated to consider more specifically what happened at the receiving end, he might have been encouraged to break down his high ideal of "humanisation" into a set of more specific needs and opportunities. All the clues were in his hands: he realised towards the end of his life that the net result of most popular education was the newspaper reading he despised; he had realised early that

> our weakness is that in an age where all tends to the triumph of the logical absolute reason we neither courageously have thrown ourselves into the solid ground of our individuality as spiritual, poetic, profound *persons*.

Hence his tendency, in his general surveys of popular education, to fob us off with a generality about the effect on the popular intelligence and the popular equity of the educational measures he is advocating. Of course, he had a point to establish; but a man of more restless curiosity might have seized his opportunities more fully, as he might have read more deeply in his chosen field. Hence something of one's disappointment with the essays here once more put before us.

Nevertheless, it is good to have them in this easily accessible form, so comprehensively edited and annotated.

G. H. BANTOCK

PHILIP H. PHENIX, *Education and the Common Good* (Harper, 1961).
JACQUES BARZUN, *The House of Intellect* (Mercury Books, 1962; Secker and Warburg, 1959).

THESE two books illustrate the uneasiness which a number of American writers feel, and effectively express, about what is going on in education and in our Western culture generally.

Professor Phenix of Teachers College, Columbia, has written a sincere and wholesome book on the moral philosophy of the curriculum. He dissociates himself from the pragmatist position that man is the measure of all things, and that things are good because human beings want them; and takes his stand in the Platonic tradition which, down to Martin Buber and Paul Tillich, holds that man himself is judged and measured by an antecedently conceived goodness, and the goal of man is to discover and be fashioned after the image of that excellence. He assumes that there are objective standards of worth on which universal agreement is in principle possible.

The all-important distinction, for Professor Phenix, is between the "life of worth", conceived in terms of a moral commitment, and the "life of desire", conceived in terms of selfish appetite. "There is a decisive difference between *wanting* something and *affirming its worth*." This contrast has its social counterpart in the distinction between the *democracy of desire*, in which values are simply what people want, education is thought of in terms of self-realisation and social accommodation, and the "good" society is likely to be one of material affluence, and the *democracy of worth*, which invites sacrifice and loyalty rather than confers gratification, whose watch-word is responsibility, and in which education is directed to learning and pursuing what is excellent.

The author reviews the curriculum in terms of the qualities to be fostered as contributing to the life of worth. He distinguishes four main qualities; the first three—intelligence, creativity, conscience—correspond with the traditional values Truth, Beauty and Goodness; the fourth—reverence—comprehends and fulfils the others and constitutes the essentially religious attitude to life. Through the cultivation of these qualities the young may be equipped to meet the challenge of our times. Such a review of the content of education in relation to its ultimate purpose is most salutary at a time when we cannot see the wood for the trees. "The most important product of education is a constructive, consistent and compelling system of values around which personal and social life may be organised. . . . Our greatest danger is not the avalanche of novelties with which the industrial age presents us, but the loss of direction that exclusive preoccupation with the problems and pleasures of innovation entails. . . . Some kind of radical simplification is essential if mankind is not to be smothered by the endlessly multiplying mass of things to be known and done. Expansion of educational opportunities cannot begin to solve the problem. Nor can specialization; which involves a relinquishment of general human responsibility for the sake of mastery in a limited field. The answer lies in focusing education upon values."

Lest it be thought that Professor Phenix thinks about education only in general terms, it should be added that his book has very practical chapters on manners, recreation, health, sex and family life, race relations, social class, the mass media.

There is a final chapter on religion. The central task of education is "religious conversion"—meaning "the inner transformation of purpose and motive from self-regarding irreligion and idolatrous service of limited goods to reverent service of the most high". For Professor Phenix religion is essentially reverence for what is best, and he is distrustful of specific creeds. Intellectually, religion means devotion to truth, and keeping inquiry open. Aesthetically, it means constant striving for creative perfection and persistent dissatisfaction with the second-rate. In manners and morals, religion means disciplined self-forgetfulness, respect for others, and the sense of vocation in work.

Profesor Phenix leaves one very big question—perhaps the most important question of all—unanswered. Having shown us the excellence of the "life of worth", in which reverence is the master quality, he reminds us that man is naturally self-centred and finds great difficulty in achieving a truly "religious" attitude. This constant human failure, indeed, is the *raison d'être* of the State. How, if at all, can man overcome the irreligious self-centredness of his own nature? Professor Phenix has no answer to this question apart from a somewhat forlorn hope. Redemption by divine grace would appear to belong to the dogmatic creeds with which he is unable to associate himself.

No description of this book in a university journal would be complete without a reference to a strong plea by Professor Phenix (in his chapter on mass media) for fuller participation by the universities in the life of the community at large. Universities and other places of education should "become centres of public education in a new sense. They should not merely cherish their own intellectual life, serving only those who come to them for instruction. They should become major centres of mass communication, carrying on a continuous work of adult education of the public. . . ."

These words about the responsibilities of the universities to the general public lead conveniently to a consideration of Professor Barzun's study of the dangers that beset the tradition of Intellect. Throughout the western world, egalitarian democracy and mass education have brought with them sloppy and irresponsible thinking. If our civilisation is to survive, we need some astringent mental discipline, not only in places of education but throughout the community, in private and public affairs. The universities should be, *par excellence*, the places to set an example and give a lead, unless their own intellectual health has been too far undermined.

The author distinguishes between intelligence and intellect. Our civilisation has intelligence in plenty; it is intellect that is in short supply. "Intellect is the capitalised and communal form of live intelligence; it is intelligence stored up and made into habits of discipline, signs and symbols of meaning, chains of reasoning and spurs to emotion. . . . Intellect is at once a body of common knowledge, and the channels through which the right particle of it can be brought to bear quickly . . . on the matter in hand." Because intellect is an institution or structure, Professor Barzun calls it a House.

It is ironical that the spread of education should have degraded intellect. Professor Barzun sees Victorian England—the England of Tennyson, Tyndall, Huxley, Bagehot, Gladstone, Jowett, Matthew Arnold—as a golden age of intellect because an established intellectual class (which Coleridge happily called a clerisy) came as near as it has ever done to wielding direct political power, and had no need of posturing before other social groups. This amalgam of interests and powers has broken up. Intellect is separated from power, and the intellectuals are estranged from one another.

Professor Barzun identifies three main enemies of intellect. One is Art, inasmuch as a great deal of modern art is in revolt against the precision of intellect and celebrates ambiguity, if not confusion. The second is Science, partly because high-powered science is increasingly unintelligible to any but specialists, who often do not understand one another, and partly because popularised science enjoys a prestige which invites unreasoning idolatry. The third enemy is Philanthropy, by which the author means "the doctrine of free and equal opportunity as applied to things of the mind", resulting in corruption of judgment. In its corrupted form, opportunity turns into social pressure to share in a wealth of instant culture—"see what the Zoo can do for you, learn Russian in your spare time, read the 101 classics during the next 1,001 nights, and paint on Sundays. . . . Education is the best recreation; square dancing is recreation; square dancing is education." At the school level "the democratic striving toward ideas . . . skips or ignores the rudiments, scorns mechanics, and looks only for brilliance. The teacher may be right to begin by saying, 'Never mind spelling, write eagerly and quickly'; but he goes on saying it so long that in the end orthography is an offence in the nostrils of the 'gifted'. The youth thinks he is writing essays like T. S. Eliot's, yet he cannot write a report like a well-trained policeman."

The following passage (p. 255) is worth quoting in full, because it illustrates as well as any the bearings of Professor Barzun's thesis on practical life. "A chief hindrance to the development of Intellect in the young is the incoherence of our sexual morality. It bedevils them by enjoining prolonged continence, yet subjects them also to guilt by tolerating inelegant substitutes and furtive infractions, attaching always, and enforcing at times, dire penalties to the crime of being found out—in a word, we show the young in every way that on this subject mental chaos rules. Science itself, allied to advertising and cultural snobbery, has complicated the fulfilment of the sexual instinct by the pedantry of 'technique', only to find this destructive of the pleasure it was meant to enhance; so that after a quarter-century of profitable pontificating and book-selling at the expense of mortified couples, the new wisdom advises a burning of the books."

M. V. C. JEFFREYS

L. A. REID, *Philosophy and Education* (William Heinemann, 25s. net).

THIS is a very unusual kind of book and one which should have an unusually wide sphere of usefulness. It is not, Professor Reid tells us, an attempt to work out the implications for education of various "philosophies"—realism, idealism, etc.: it is not a text-book "if that means a brief comprehensive survey of the whole field".

"It is an introduction, through discussion of a few questions basic to philosophy of education. It is meant to shew by example certain ways of asking questions, and ways of attempting to give answers to them. It offers, incidentally, some tentative answers; it presents unashamedly a point of view as well as a method. (p. xiv)."

The reader will not know which to admire most: the weight of the questions selected for discussion, the range of reading and reflection brought to bear on them, or the easy mastery with which they are marshalled into a lucid and coherent whole in the compass of 199 pages. Still more admirable, in a book addressed in the main to readers who "have not

. . . even an elementary philosophical equipment", is the freshness and sense of urgent relevance with which the material is used to present the issues: Professor Reid has triumphantly avoided the besetting sin of the text-book, what he describes, in discussing the curriculum in schools, as "the vicious habit of second- and third-hand learning—memorising answers ready worked out for the pupil in diagrams and text-books, *with no real enjoyment of anything real*—whether it be science, or poetry, or history" (p. 197, italics mine).

The book is divided into two parts. The first opens with a discussion of the function of philosophy. After a brief review of the attack by the logical positivists on the traditional view of philosophy as giving us a sense of direction and proportion he reaches the conclusion that "more flexible accounts of the use of language and of rational justification re-open the paths—temporarily and arbitrarily closed—to basic thinking on the great traditional questions of philosophy" (p. 16). In the next chapter he introduces us to four of these questions which, he thinks, have important implications for education, and then plunges us *in medias res* with a discussion of "Values in Life and Education" (ch. III) and "The Justification of Judgments of Value" (ch. IV). Chapter V discusses how we reach right decisions in particular situations, and chapter VI the "application" of theory to practice in education. Chapters VII and VIII deal with the personal self and its freedom. Part II deals more directly with practical problems, the nature and use of punishments and incentives, the nature of teaching, the need for "depth" of experience and understanding "in a world increasingly depersonalised by mass-conditioning, in which the roots of being get choked up". The last chapter (XIII) considers the professional education of teachers.

For many readers the chief interest of the book will probably be his presentation of his own point of view. For him "*Persons* is certainly a key word in education and life". This conviction colours the whole of the book, whether he is speaking of knowledge, which "although partly expressed in statements, never *consists* of the statements. It is what is possessed by the living mind of the person who makes the statements" (p. 35) or of responsible decisions (often at the cost of moral pain): "It is we who come to the occasion and make the decisions. This is a personal judgment and there is no adequate analogy to describe it" (p. 74). But "persons", as he is aware, may "mean nearly anything or almost nothing", and so the attention of teachers is directed to the importance of the philosophy of personalism, especially in the teaching of Mounier, and to Martin Buber who "in his strange, often irritatingly obscure, oracular and challenging way, has made encounter, or 'dialogue' the centre of his thought". The two chapters on "The 'Personal Self' " and "The Freedoms" are in a way central to understanding his position, and his statements of his more personal convictions must be read in their closely reasoned context if they are not to be misunderstood. But since he agrees with Waismann that " 'No philosopher has ever proved anything. The whole claim is spurious' " and that the central purpose of philosophy is "*seeing* freshly. The seeing is the seeing of a man-in-the-whole-living-enterprise-of-his-thinking, and this can never be adequately translated into propositions" (p. 13) it is perhaps not unfair to set two passages side by side.

(p. 119) "Dr Johnson was right, though he did not say all that there is to be said. We *know* perfectly well that we can choose to make or not to make the effort to think straight, to recognize obligation, we *know* that we can resolve or not resolve, do or not do. We *know* freedom in all these senses".

(p. 125) "The general conclusion, then, is that although there can be no water-tight proof of freedom of choice, the assumption of freedom accords well with the facts of experience, including moral experience. Radical determinism (equally "unprovable") appears to represent a limited point of view which just does not fit all the facts of the picture, and can appear to succeed only by explaining them away. And in its most radical form it seems to be self-contradictory".

The former is that to which he is committed in the-whole-living-enterprise-of-his-thinking, the latter is that which he holds himself to have established by formal logical argument. Both, he would maintain, are "rational".

Finally, may a reviewer end by a little grouse? So good a book deserves a more adequate index. It would no doubt be pedantic to insist that every casual mention should be listed, but there is no mention of Hume in the index, although his definition of cause is quoted on p. 26, and his definition of the self on p. 99. Both are important texts in the history of philosophy, and the latter is used by Professor Reid as the starting point for his discussion of the personal self. Believe it or not in a book about the philosophy of education, there is no entry under "Plato"—there are as a matter of fact important references to Plato on pp. 5, and 122. Nor are these the only omissions.

MARGARET B. HOBLING

KATHLEEN OLLERENSHAW, *Education for Girls* (Faber and Faber, pp. 195, 18s.).

IN her book, *Education for Girls*, Dr Ollerenshaw is troubled that, though the expansion in girls' education is already proceeding, yet there seems little concern about the theory that should underlie such expansion. She questions whether the current assumptions that girls' education can follow roughly the same lines as boys', allowing Domestic Science to alternate with Woodwork, and the girls to specialise on Biology while the boys study the physical sciences, are good enough. Beginning rightly with the premise that, although the girls now being educated in the schools will be married and involved in rearing their families long before they can use their education to the full in responsible posts, yet they will certainly be required in work, part-time or whole-time, by the nation, as well as probably for their own satisfaction, when their children have passed the early stages, she maintains girls' education must consider more carefully the young wife's duties to the family and her return to employment some fifteen years later.

The book is written mainly for interested parents faced with a very different sociological and educational situation from that of their own youth. Dr Ollerenshaw hopes there may be points of interest also for teachers, administrators and members of committees—as indeed there are.

It is because the emphasis is on education for life—that is, for life at school and during further education, when married and when returning to work and even in middle age—that the first chapter deals with work and marriage and the last with further education and voluntary work. It is particularly encouraging to see the last considered, for that is surely a way in which the married woman gives to the community, as well as herself receiving much that is stimulating and satisfying.

In between these chapters consideration is given to the present education of girls from the primary stage through the secondary school, including the G.C.E. and the sixth form, to higher education at university and college and in sandwich courses and by day-release. Indeed so much information is given and so many ideas are offered that one sometimes wishes there were room for more discussion.

As there is little differentiation between girls' and boys' education necessary at the primary stage, this part is dealt with shortly. The whole is summarised by the words, "If they (the children) can arrive at the secondary stage knowing how to learn, how to appraise their own work, how themselves to set about finding the answers to the thousand-and-one questions which lively minds think up every hour of the day and how to carry through to completion a job begun, the primary schools do well." They do indeed! A good many secondary school teachers would be glad to know their old pupils could pass such a test.

Dr Ollerenshaw's experience of education as university lecturer and in a number of administrative capacities makes her aware of many of the difficulties in the way of her ideals—of limits, not only of buildings and of money, but also of enthusiasm for education of many girls. She also focuses usefully the dichotomy in girls' education between "bowing too deeply to the demands of the world of work or making too many concessions to the girls' future roles of home-makers, and paying too detached and vague a lip-service to the value of the older academic disciplines".

Both for the less academic and for the more gifted girl there is a plea for more education for marriage, not only by sex-instruction but by a wider preparation for the responsibilities which the girl now assumes so early.

Perhaps it would be cavilling to ask where in the time-table this can be included for the girls preparing for the university, of whom Dr Ollerenshaw wants a far greater number than at present, and for those going on to the more stringent trainings.

The desire for more women graduates leads to a request for university courses more deliberately suited for girls, and the suggestion of Liberal Arts colleges—for which two A level subjects and a wider general education in the VI would be a more suitable preparation than the more specialised three A level courses usually needed by would-be university candidates at present. A danger in this suggestion would be that the girls would study in a discipline which would tend to be purely feminine and one which might not maintain its standard because of a feeling of inferiority towards it, stemming from the apparent greater ease of entry and the fact that few men would share it. The writer is very aware of the mental inertia from which many girls suffer, so that considerable stimulus is necessary to get them to work consistently to the top of their capacity. (This may easily be due to the "permanent overtiredness" of teenage girls of which she speaks in another connexion). This is possibly a rock on which many of our educational efforts founder.

The case for continual adaptation of syllabuses in the light of present and future developments is well-made. We need to think frequently whether we are offering our girls "a balanced curriculum" to "help to give women a better knowledge of human relationships, a keener desire to play their full part in local affairs, a stronger interest in the nation's economic and social life, a more critical interest in national and international current affairs and movements and, above all, an appreciation of the need for service in a variety of forms". It is a fair challenge. Schools should be doing this. The difficulties in the way of accepting the challenge are recognised—often inadequate space, financial stringency, but, above all, the instability of the staffing situation in girls' schools and the serious shortage of teachers, particularly in Science and Mathematics which, with her special interest in Mathematics, Dr Ollerenshaw considers particularly carefully. It is true that part-time teachers are a most valuable addition to the Staff and many schools make use of them gladly. It is also true that part-time teachers have difficulty in undertaking the pastoral duties, the importance of which is rightly stressed.

In writing of the sixth form an appeal is made by the author for more flexible education than that of boys. As it is usually the woman who has to make the adjustments in marriage, serious over-concentration in academic work is considered "totally inappropriate". More adventurous thinking about the methods of teaching non-examination subjects is urged, especially for quick concentrated teaching of new subjects at this stage.

Among the points about the sixth form Dr Ollerenshaw suggests their uniform should be "simple, adaptable and in fashion", from which it must be concluded that she has never been a sixth form mistress. Otherwise she would remember that fashion changes too rapidly for parents to be given due warning of a change in uniform.

In order that the sixth form may be able to avail themselves of university education and to help in the staffing situation, pleas are put forward for a first degree in education, divided courses for the early-married and more grants for the mature student. A sound point is made that it is at sixteen that girls are discouraged from attempting to go to the university, not only by parents and by fears of financial stringency, but also because the courses offered attract only a minority of the girls who should be capable of following a university course. As is suggested, however, the three-year training in the training colleges may serve these girls. An increase in pass degree courses would not only give more girls the opportunity of university training, but would also provide valuable staff for the schools. An interesting point is made that "sandwich courses" for teacher training might be an additional incentive to some of the potential trainees. The last suggestion is in line with the earlier proposal for experiment in combining school, courses with part-time work in hospitals, nurseries, banks, offices and shops.

In her final summary of future plans Dr Ollerenshaw stresses the need to extend the education of girls by all possible means. Not content with raising the school-leaving age, making day-release compulsory, increasing the number of girls who go to further training, she would also like to supplement all this by residential courses for women in adult education colleges ("if necessary including limited nursery accommodation").

But especially she pleads for a greater appreciation of the responsibilities of the teaching profession. "The nation to-day stands or falls by the aggregated quality of all citizens—it is the teachers who are the principal cultivators and custodians of this quality."

The value of this book lies in the breadth of its sweep so that girls' education is thought of as a continuing process, almost from the cradle to the grave, and in the attempt to support ideals with practical suggestions to overcome the difficulties that would be met with in putting them into practice.

M. MANDVILLE

J. A. HADFIELD, *Childhood and Adolescence* (A Pelican Book, pp. 286, 1962, 5s.).

DAME OLIVE WHEELER, WILLIAM PHILLIPS and JOSEPH SPILLANCE, *Mental Health and Education* (University of London Press, pp. 208, 1961, 15s.).

IN more than one sense the above two books may be considered as being complementary: while the first is aimed at the "intelligent" parent and the second at educationists, both would seem to be most suitable for the student training to be a teacher. Both emphasise the paramount importance of the home and of family relationships in fostering and maintaining healthy emotional growth; both stress the interrelationship between physical, emotional and intellectual development; and both plead persuasively the need for a preventive outlook in the mental health field, with the need for parent and teacher education in the principles of mental hygiene as a logical corollary. Dr Hadfield maps out in great detail the early stages of growth, devoting more than a third of the book to the first four years of life; there are plenty of examples and practical suggestions on how to meet difficult behaviour, or better still, how to prevent it from arising. The discussion of the middle years of childhood, from seven to twelve years, seems rather scanty (a mere 12 pages). Adolescence is dealt with in considerably greater detail, with a section specially devoted to abnormalities and disorders during this period of growth. Though written from a generally psycho-analytic point of view, Dr Hadfield's outlook is broad and eclectic enough to include conditioning and learning theories.

All three authors of *Mental Health and Education* agree that (to quote from one of them) "nothing short of radical re-orientation (on the part of parents and teachers) will serve to prevent much personal unhappiness and social inefficiency". Unfortunately this is not offered. The ideas and practical suggestions are sound enough but are too general and superficial to bring about any re-orientation and too pedestrian to inspire enthusiasm, let alone new thinking, among parents or teachers. There is a growing number of educationists which is convinced that present educational practice fails to foster mental health because of over-emphasis on intellectual pursuits; and that this neglect increases as the pupils pass up the educational ladder from nursery school to university. Those looking for the new and radical measures which would seem to be required if education is to play its part in the prevention of mental ill-health will be disappointed; those who are chary of provocative ideas but are looking for a clear and critical appraisal of the role played at present by the educational system in relation to mental health will find a very adequate guide. Thus Dame Olive Wheeler, who wrote three quarters of the book, outlines educational theories and practices, including a discussion of further education, the transition from school to work and adult education. These chapters would provide a good introduction to training college students since it gives a bird's eye view of the administrative, psychological and sociological aspects of present educational practice at its best and worst.

Curiously enough the two books under review also share the same defects. Perhaps chief among these is a rather careless and erratic approach to references: neither book has an author index and in the general index are listed some, but not all, of the authors referred to in the text. Similarly, in both books details of authors, mentioned in the text, are given in footnotes but in some cases an author is referred to in the text only, with no indication as to when, where and by whom his work was published; no clue is given in either book why some authors are treated in this way and the fact that on the same page two authors may be referred to and only one is accorded a proper reference, makes it all the more baffling. It must be hoped that in future editions these omissions will be repaired and that a bibliography will be added. This would enhance the value of both books to students, be they teachers in training or parents.

M. L. KELLMER PRINGLE

BRIAN JACKSON and DENYS THOMSON (eds.), *English in Education* (Chatto and Windus, 1962, 21s.).

THE teaching of English is hedged with difficulties, the first of which is the haziness of the subject's definition. A century ago the aims were clearer. For some children there was merely the need of elementary literacy, for others the assumption of a literary heritage. When gigantic social changes and the findings of psychology rendered these aims totally inadequate, many teachers, uncertain of their own purposes and function, were glad either to bow to popular demand and become purveyors of skills or to cling to the expanding system of examinations and gear their work relentlessly to it.

If a body of thought has been assembled and if a coherent philosophy of English teaching is emerging, if the needs of individual children are being honestly recognised, these advances owe much to the editors of *The Use of English* and their contributors during the last twenty-three years.

English in Education is a collection, edited by Brian Jackson and Denys Thompson, of articles which have appeared in the journal. The writers are people experienced in teaching, individual in their experience, their experiments, their emphasis, but united in a strenuous fight. Their common enemies are mistaken values, such as appear in the substituting of pseudo-moral for literary judgments, or in linguistic snobbery or in synthetic text-books; mental laziness and facile thought; twentieth-century circumstances which tend to produce the stock-type of human being; grading and examinations; in fact, all the forces which operate to neutralise the individual child.

Of their common aims the two foremost are to cultivate in their pupils "the habit of disciplined attention" to the spoken and written word in whatever context; and to strengthen the individual's capacity for "imaginative realisation" of life.

In the statement of ideals and formulation of policy, in the substance and suggestion of its articles, the book is collectively valuable. Among individual essays, two on Conrad by G. Klingopulos and J. D. Hainsworth are highly relevant to the teaching of all good fiction; and Charles Gillie's analysis of *Twelfth Night* offers a useful basis for classroom work. In the article on Young Readers' Digests, Douglas Brown convincingly defines his criteria for judging "popularisations" and abridgments. In almost every article, as well as in the concluding section, Notes and Bibliography, there is stimulus to further reading, further experiment.

The brief section at the beginning of the book which allows children to speak for themselves, may serve to remind teachers of the range of their ils' sensibilities, the sharpness of feeling and of expression of which y are capable.

People who already know these essays will find that they repay further quaintance, whilst young teachers coming new to them may be glad to ecognise what Denys Thompson calls "the goal and the direction". His own final sentence is that "a companion volume would offer ways and means". In such a volume, one would welcome some examination of modern works and their suitability as teaching material.

Of the twenty-three articles assembled in this collection, only three are by women. Is it optimistic to hope that in the next twenty years there may be more women contributors to *The Use of English*?

ELIZABETH LAW

KARL MANNHEIM and W. A. C. STEWART, *An Introduction to the Sociology of Education* (Routledge and Kegan Paul, London, 1962, 21s.).

THE tragedy of Mannheim's death in 1947 at the age of fifty-four after he had held the chair of Education at the London University Institute of Education for only one year is emphasised by the appearance of this work. His general position on the great dilemma of our epoch had been clearly formulated in Diagnosis of our Time—the evils both of laissez-faire and of dictatorship can be avoided by a society which plans for freedom. This, his Third Way, depends on democratic consensus, an agreement which provides a framework of general social and political values within which the individual is free to work out his personal beliefs. In Diagnosis Mannheim made it clear that he regarded education as one of the chief instruments for developing the new consensus. His acceptance of a chair of education showed his readiness to apply his creative ability and his massive sociological expertise to the development of a theory and practice of democratic education.

What we have, then, in this volume are the first steps in Mannheim's educational thinking, an evaluation of current psychological theory on learning and personality, an examination of some of the implications of the sociological approach to education and a statement of some fundamental questions—what should the educational aims of modern society be? Are our "basic virtues" deteriorating? What are the social factors influencing personality and how can they be controlled? What alterations are taking place in "the balance between the contributions of the home, church, school, factory and public life towards moulding individual character". Is the cultural decline in our society due to the disintegration of the leading élites and should education be concerned with producing new élites? What are the factors "making for the disintegration of personality and dehumanisation"?

Some of us who sat at Mannheim's feet in that memorable year at the Institute of Education have waited a long time for this book—perhaps too long and perhaps with too great an expectation. For this book is now to some extent out-of-date since the last fifteen years have seen imp developments in social psychology and the sociology of education.

"The classroom and the subjects taught in it are vitally important, of cou but we are concerned in addition with learning, as each person undertak it, and with all the educational influences which go to form the environmen to which each person responds." (p. 10)

and:

"In a civilisation like ours we have to see to it that we prepare children to grow up with a sense of continuity and tradition while at the same time equipping them with a readiness to recognise the need for change and the adaptability and initiative to act." (p. 110)

Such statements are now commonplace and remind the reader that Professor Stewart is dealing with material that was first compiled in 1947. He has attempted to fix the book in its 1947 social, political and intellectual climate and has given Mannheim's bibliography with no (or very few) references later than 1947. Had Mannheim's manuscripts been copious, needing only editing, this attempt would have succeeded. But it was inevitable that Professor Stewart's awareness of developments since 1947 should impinge on Mannheim's material and the resulting picture is occasionally blurred.

The sections are uneven in profundity and insight and even in the quality of the expression. But such sections as Training, Instruction, Teaching and Education, The Historical Character of Educational Aims, Primary Groups and their Educational Significance, Sociology for the Educator and the Sociology of Education are among the most stimulating things that have been written in recent years on education.

S. MORRIS

MOLLIE DAWSON, *Netball* (G. Bell and Sons, London, 1962, 11s. 6d.).

THIS little book deals with certain aspects of a game which has changed radically in the recent past and it is therefore exceptionally welcome. Each chapter is contributed by a different person and in each case the writer is an expert in her subject. There are chapters on attacking, centre and defending court play by international players and on umpiring, coaching and organisation by committee members of the All England Netball Association. The difficult subject of defence has been dealt with particularly well and everyone can learn something from the chapter on coaching.

The book assumes that the reader has some knowledge of the game but it is easy to read and understand, except in the one or two places where errors relating to diagrams or photographs have crept in. Since it deals with issues in a practical way it should be of interest to players of all standards and to teachers of the game.

B. KNAPP

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E. A. PEEL
H. J. HALLWORTH
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CHILDREN'S CONCEPTS OF TIME AND HISTORY

by GUSTAV JAHODA

Senior Lecturer in Social Psychology, Glasgow University

1. Introduction

"IDEAS too difficult to grasp for the pupils should be avoided" (1). This is no doubt wise counsel for teachers, but it is by no means easy to decide what kinds of ideas are liable to be "too difficult". After prolonged and intimate experience with a variety of children, some teachers probably acquire a kind of intuitive knowledge of the level of difficulty which children coming from particular social backgrounds may be expected to cope with at different ages; however, discussion with teachers indicates that this does not invariably happen. A generation ago it was stated that "the working contents of the average child's mind are likely to be far more limited than most teachers assume" (2). There is reason to believe that this view remains substantially correct to-day, albeit for somewhat different reasons from those envisaged by the authors of the Report. They were thinking especially about the limitations of experience imposed by their environment on underprivileged children. Thus a majority of eight-year-old pupils at elementary schools located in the poorer districts of London in 1924 had never seen the sea. With the advent of the welfare state there has certainly been much improvement in this respect. Higher standards of living among manual workers have tended to widen the horizon of their children, both directly through being able to move around more freely, and indirectly through such media as television.

It would be rash to conclude, however, that the problem has thereby been eliminated. The truth is that it is far more deeply rooted in the nature and characteristics of mental development. The world of the young child is different from that of the mature and sophisticated adult; the difference is also a subtle one, involving the basic categories of thought such as space, time and causality. We owe our increasing understanding of the manner in which these basic concepts are formed largely to the work of Piaget and his followers (3). Here it can only be mentioned briefly that he views conceptual development as passing through a series of stages, which he tried to identify in various spheres. As an example, the notion of conservation of substance may be taken, because the experimental procedure is very simple. Children are shown two balls of plasticine of the same size, one of which is then rolled into a sausage. From four to seven years, when according to Piaget the child's thought is largely dominated by his perceptions, the child believes that the amount of plasticine in the two different forms has ceased to be the same. Then there is a transition stage, with the child vacillating and feeling unsure, followed from seven to eight onwards by a firm assertion of conservation, backed by logical arguments. A repetition of the work in this country substantially confirmed the existence of the three stages. Lovell and Ogilvie (4) observed that in the first two years of junior school there seem to be many children "who have not attained much concept of the invariance of substance". This finding is not without some practical applications, for it appears that "some children are prepared to pay more money for a piece of toffee when it is in one shape than when it is in another". The authors also issued a pertinent warning about the dangers of "accepting a child's apparent understanding at face value".

The lesson of this, as well as numerous other studies, is that the limitations of the child's capacity at any particular stage cannot be easily gauged. One of the major sources of the difficulty stems from the fact that concepts are largely represented by verbal symbols, which enables them to be manipulated in various complex ways. Otherwise, much of high-level abstract thought would be well-nigh impossible, just as the economy of a modern industrial system would be incapable of functioning if every transaction had to be carried out by actually transferring coinage. In brief, verbal or other symbols stand for abstract concepts, whereby large slices of experience are organised into order and coherence. However, reverting to the analogy, verbal symbols as used by children may often be dud cheques. Knowledge of the verbal symbol is no guarantee that the corresponding concept has been fully assimilated. The concept itself may be partial, vague and nebulous at first, becoming sharp and clear later, but the verbal symbol is the same all the time.

It may perhaps be felt that it ought to be relatively easy to detect conceptual shortcomings by noting misuse of words. This certainly is true of the cruder mistakes made by pre-school children, who often wrongly name concrete objects. Later, when abstract terms come to be more commonly employed, this becomes increasingly difficult. Children acquire from their linguistic environment information about the probability of occurrence of a word within the broader lexical structure, before reaching full awareness of the underlying concepts (5). Thus the odds are in favour of a new word soon being used in such a way that the sentence as a whole makes reasonably good sense. In the absence of specific knowledge on the part of the observer, a mistake may thus go unrecognised. For instance, if a child says "I went to see my granny yesterday", there is nothing in the utterance itself which would enable one to deduce that the event had in fact occurred a fortnight earlier.

Another difficulty arises from the widespread and well-established tendency of human perception to impose a meaning or significance on to incoming communications which is in accordance with one's own stable frame of reference. In other words adults are apt, quite unintentionally, to read into children's sayings a meaning which is in line with their own mature categories of thought, although these may in fact be well beyond the capacity of the child.

The purpose of the discussion so far has been to bring out some of the reasons it is far harder than might appear at first sight to form reliable judgments about the "working contents" of children's minds, and to decide which ideas are likely to be "too difficult to grasp" at any particular stage. Confident answers to such questions can only be given on the basis of empirical research, and this is becoming increasingly recognised in relation to such topics as number or the nature of the physical world. On the other hand, the numerous and often valuable findings concerning concepts of time and history remain largely buried in various specialised publications. The aim of the present article is to collect some of these and fit them into a broader context.

2. TIME

> What confusion reigns for a long time in the child's little head before he grasps that the ever-moving present turns to-day into yesterday and to-morrow into to-day!
>
> WILLIAM STERN, 1923.

The approaches of the writers who have dealt with the origins and development of time concepts in children (6) may be roughly divided into three groups, which do of course overlap in practice. The first focuses on what might be called the emergent experience of temporality, of things in flux and change with a gradual reaching out into future and past. The methods used are mainly qualitative and observational, in the continental European tradition. Examples of this are Freud (7) or Malrieu (8). In contrast to this, Anglo-American psychologists have been more pre-occupied with the acquisition of a time vocabulary, and with the growth of understanding of clock and calendar. Methods tend to be more formal, consisting mainly of systematic questioning or tests of various kinds. The frequently quoted studies of Ames (9) and Springer (10) belong to this category. Lastly there are Piaget and his followers (11, 12), who have already been discussed. There are of course several studies which cut across these divisions, in terms of methods and/or theoretical formulation (13). In spite of such diversity of viewpoints, there is fairly wide consensus about the nature of the broad developmental trends. An attempt will be made to offer an outline (inevitably oversimplified) of these, with special reference to the past.

Before about the age of five, time and space are confounded in the mind of the child. Time is not a uniform and homogeneous flow, but tied to particular objects, locations or events. While both a rudimentary notion of before and after, and a sense of duration exist, the two are not yet co-ordinated. The past is a mixture of isolated fact and fancy, dictated by the impulse of the moment. Things are remembered in a simultaneous manner, and grouped into the single category of "yesterday". The past is thus a kind of shallow mosaic of disparate impressions, whose interrelations are determined by factors other than chronological sequence.

If a young child is asked to describe a recent event such as a party, or a journey, he is unable to produce more than isolated elements. The task of arranging a set of pictures into a coherent sequence (e.g. someone going up to a tree, picking the fruit, departing with the basket full) is beyond his capacity. These observations should not be misconstrued as implying that a young child's memory is very short, which is not the case. Many observers (including the writer) have noted that small children are apt to recall suddenly and often vividly something that happened several months previously, though such recall cannot be distinguished from that of recent events unless the observer possesses the relevant information.

Gradually, somewhere around the age of five, an ordering of past events into earlier or later begins to emerge. The past thus gains in depth and is structured into a succession of events. The extent to which such sequential ordering is mastered depends on the degree of familiarity with such time cues as are available. For instance, Lovell and Slater (12) gave children six pictures of an apple tree in various stages of growth (i.e. of differing size). The children were asked to show how the tree grew, by putting the "youngest" to one side and completing the series. Twelve out of twenty children between five and six were able to accomplish this. On the other hand Bradley (14) used an analogous task, involving pictures of a baby, a boy, a youth and so on. In this case not a single one of eighteen five-year-olds succeeded; four out of twenty six-year-olds, and fifteen out of nineteen seven-year-olds were able to do it.

From this stage, where succession has been grasped, onwards, further organisation of thought depends largely on the mastery of conventional time divisions. This, one needs to stress, lags considerably behind the acquisition of the appropriate vocabulary. Here a short digression is perhaps indicated, to point out that there are alternative time divisions from those we are accustomed to take for granted. Sorokin and Merton (15) expressed this very neatly:

> The category of astronomical time is only one of several concepts of time. Social phenomena are frequently adopted as a frame of reference so that units of time are often fixed by the rhythm of collective life.

They illustrate this by mentioning that the inhabitants of Madagascar used to speak of doing something "in the frying of a locust" (i.e. a moment) or "in a rice-cooking" (about half an hour). Radcliffe Brown described the "calendar of scents" of the Andaman Islanders, who marked the different parts of the year by its characteristic succession of scents. Among the Konkomba of Northern Ghana large markets are held in a six-day rotation, and each is the central market of a cycle of smaller markets. The Konkomba take the names of the days of the week from the market held each day of the cycle. The names of the days of the week vary, almost from clan to clan, according to the markets that any given clan regards as in its cycle. The markets are therefore a method of assessing time and space for the Konkomba.

Our own system of reckoning time, ranging from milliseconds to millennia, is a very complex one, adapted to the requirements of a scientific and technological civilisation. It is not surprising therefore, that the process of acquiring this is a slow and gradual one. Some of the relevant research findings have been summarised by Lovell (16). In the present context one particular aspect of this process must be stressed, namely the difficultly experienced by children when dealing with *temporal relationships*. While it is generally agreed that children can tell at the age of six how old they are, this does not entail a capacity to handle the relationships "older" and "younger" correctly. This was shown in the previously quoted investigation by Lovell and Slater (12); when a series of pictures of a pear tree, stated to have been planted a year later, was compared with those of the apple tree, children aged five and six exhibited a very limited ability to sort out the relationship between the two series; thus they were apt to describe the pear tree as being the oldest of all, because it was now the tallest. This illustrates the use by children at that stage of extraneous cues, which may lead to errors. Farrell (17) also noted such a tendency, e.g. if a child is tall, he is old. Bradley, following Oakden and Sturt (18) whose results were closely similar, asked the following questions: "When you are ten, will you be older or younger than you are now?" and "Will your mother be older, younger or the same as she is now?" About one-quarter of children aged six gave incorrect replies.

Returning to the system of time reckoning, there is broad agreement that basic temporal concepts such as years and their subdivisions, seasons, and so on and the notion of what some writers describe as "objective and continuous time, i.e. clock time", are not mastered until about the age of seven. Some concepts are clearly dependent on the growth of number meanings and relationships in the child's thinking. For example, Harrison (19) argues that the full meaning of "month" eludes him until there is a correct concept of thirty and thirty-one and their relationship to seven days. Moreover, several of the studies, and in particular that of Buck (20), indicate that the development of time, as of other concepts, is associated with intellectual level.

Many of the writers cited have been exclusively concerned with the child's ability to handle conventional time divisions, leaving aside the problem of the conceptual distinctions between modes of measuring periods or intervals, and the actual passage of time in terms of changing events. One study quoted by Fraisse (21) came to grips with this. Michaud asked over 1500 children aged between ten and fifteen the following question: "What happens to time when one puts the clock forward in spring, jumping suddenly from eleven p.m. to midnight?"; in order to make this more concrete and less liable to purely verbal confusion, he further asked if this also made them suddenly older. At the age of ten, about three-quarters of the children did not yet consider time as an abstraction, and they felt that the advancing of the clock had repercussions on their age. It was not until thirteen that half the children understood time to be an abstraction which may be considered independently from the functioning of a clock, and that clock time is merely a conventional measure without influence on the changes which occur.

Another interesting approach, with a close bearing on concepts of history, is due to Friedman (22). He presented his subjects with a set of twelve events, inviting them to assign these to one of four indefinite time categories: "A long time ago", "A short time ago", "A short time to come" and "A long time to come". A selection of responses by children in grades 4-6 (approximate age-equivalents nine to eleven) relating to "A long time ago" is given below:

Yesterday (1 per cent)
Last summer (44 per cent)
Last Christmas (52 per cent)
The day I started kindergarten (84 per cent)
Bible times (89 per cent)
The time when George Washington lived (93 per cent)
The time when the Pilgrims lived (96 per cent)

Although this was not its aim, this study serves as a reminder that past events can also be ordered subjectively, without reference to the conventional time scale, but merely by the feeling that one particular event seems longer ago than another.

This subjective aspects of judgments relating to more extended periods of time (as opposed to brief intervals) does not appear to have been much investigated. A suggestive exploration was undertaken by Cohen *et al.* (23). They gave their subjects a 10-inch long line, representing their life from "birth" till "now", asking them to mark off intervals indicating how long *it seemed* since a set of particular events took place. The findings are best expressed in the authors' own words:

> For intervals up to about six months the form taken by the subject's estimates is such that as the actual intervals increase logarithmically his estimates increase in approximately linear fashion. Intervals beyond one year yield estimates which are approximately linear and go back to the point representing birth. In other words, the linear portion of the line is divided up in a way which would be arrived at by calculation. This linear effect is, indeed, obtained when subjects instead of being asked to judge apparent intervals, are asked to locate historical events along the given line. It would seem, therefore, that by this method the subject is unable to ap-

> preciate comparative intervals greater than about 1 year from now and is only able to locate events.
>
> Thus, the immediately preceding 24 hrs., for example, seems a relatively long time in proportion to the preceding month, whereas there is no perceptible disproportion when comparing the previous five years with the previous ten years. These latter judgments (i.e. for intervals beyond 1 year) are made in an entirely different fashion and seem unable to be formed without reference to dates or events in one's personal past to which dates can be assigned or age estimated. (p. 110)

These conclusions indicate that unless a person has a linear scale at his disposal (or, it should be added, some alternative frame of reference), he may be unable to arrange past events beyond about six months even on an ordinal scale. Although this is not mentioned by the authors, such an interpretation receives some support from the responses of the youngest age-group (about $8\frac{1}{2}$) they tested. Further confirmation of this view may be obtained by reverting to a cross-cultural perspective. One of the classical studies in this sphere is that of Evans-Pritchard (24). The Nuer have words for this year, last year and the year before last, but nothing before that (incidentally, they have no expression equivalent to "time" in western languages). Time-reckoning over a longer period in the past is either with reference to particular events such as ceremonies, fights or raids (which vary of course from group to group), or by reference to the age-set system; anthropologists label this "structural time", because it is closely related to social structure: the larger the social unit considered, the greater the depth of its time span. However, even the maximum is very shallow by our standards:

> In the course of time the names of years [labelled according to events] are forgotten and all events beyond the limits of this crude historical reckoning fade into the dim vista of long ago. Historical time, in this sense of a sequence of outstanding events of significance to a tribe, goes back much farther than the historical time of smaller groups, but fifty years is probably its limit, and the farther back from the present day the sparser and vaguer become its points of reference. (p. 105)

In such cultures the remote past remains indissolubly intertwined with mythology. Our kind of history presupposes the existence of a linear time scale, and this in turn entails a particular conception of the nature of time.

3. HISTORY

Our conceptual image of time is that of an even and continuous flow from a remote past to an indefinite future; and we regard history as the ever-changing pattern of events which are, as it were, the ripples on the stream of time. However axiomatic this may seem to us, it is again only one perspective among others. In antiquity the prevalent view of cosmic time was one of world-cycles, with alternating periods of growth and decay. Some of the Pythagoreans maintained that each cycle was the exact replica of the next, down to the minutest particular, so that "an endless number of Platos would write an endless number of Republics" (25). If such a notion appears odd and perhaps even repellent, it may be salutary to remember that the concept of time implied by the theory of relativity is equally strange and remote from "common sense".

Similarly, when we think about history, we associate it with dates and chronological sequence. This would not apply to early Greek historical writers such as Herodotus or Thucidides, in whose thought the successive acts of men formed, in Focke's felicitous phrase, not "a red line" but "red patches". The chronology of Herodotus was imaginary, the sequence of events either legendary or invented by the author. Thucidides, although fond of quoting facts and figures, made practically no reference to dates; he organised the succession of events logically rather than chronologically. In the Middle Ages, Augustine's approach to history was primarily theological. Most of his dates, like those of other contemporary writers, were symbolic rather than factual. What interested him was not the "real" date of an event, but the establishment of parallels between profane historical fact and the teaching of the Scriptures (26).

The purpose of these comparisons is to indicate that conceptions of time and history, far from being natural and self-evident, are largely conditioned by the prevailing social and intellectual climate. What children are being taught to-day is the product of a long period of intellectual evolution. Recognition of this fact may help to guard against underestimating the difficulties encountered by the child in acquiring adult notions in this sphere. These difficulties have been amply documented in the literature.

One of the early pioneering studies was that of Oakden and Sturt (18), replicated and substantially confirmed twenty-five years later by Bradley (14). A few examples will illustrate their imaginative approach. They presented children with the following problem: Robin Hood lived in 1187; (*a*) Would your mother be alive then? (*b*) Would your grandmother? Adopting Bradley's criterion of 75 per cent success as indicating reasonable grasp by any given age-group, both researches agree that (*a*) is not correctly understood before seven years, and (*b*) not before nine years. It ought to be pointed out that these are conservative estimates, as no allowance was made for lucky guessing. From the children's comments reported it seems likely that Robin Hood's name, linked in their minds with such phrases as "in the olden times", rather than the date, provided the clue for the right answer. Evidently children's time perspective before the age of about nine is very shallow, becoming nebulous beyond the span of one or two generations.

Being able to name the year—several independent investigators agree on about eight as the age when children can do this—does not entail any appreciation of the broader chronological system. Oakden and Sturt dealt with this problem by means of a simple test. Its first tentative form consisted of putting up on the blackboard five historical names with dates attached, the task being to arrange them in chronological order "beginning with the one who lived longest ago—furthest away in history". With this form only 20 per cent of children aged ten were capable of answering correctly, so the total was reduced to sets of three names. Here is one of them, also used by Bradley:

Attila lived in Hungary in 438 A.D.
Philip lived in Spain in 1585 A.D.
Nero lived in Rome in 50 A.D.

There was some divergence of the results at the lower age levels, probably owing to differences in the types of schools sampled. However, the overall trends were closely similar, and the percentages given below represent the average of Oakden and Sturt and Bradley.

Ages	8	9	10	11	12
Per cent correct	35%	55%	62%	86%	85%

Thus it was not until eleven that more than three-quarters of the children understood the basic implications of historical dates. One last illustration, which also bears directly on teaching: children aged ten to eleven who had received a whole term's lessons on the social life of England during the time of the Stuarts were given a sentence-completion task composed of such items as "The occupations of the English in the time of Charles I were . . . ". The outcome was disappointing from an educational standpoint; not infrequently the children attributed to the reign of Charles I the mud huts and human sacrifices of the ancient Britons, or the idols of the Romans.

Nearly all seem to have "'lumped' all historical periods together, giving them the general attributes of savagery". In the light of this one might perhaps question the usual practice which favours the introduction of history through "stories of long ago".

These extracts should be sufficient to indicate that the work of Oakden and Sturt was original and rich in insights. By present-day standards some of their methods are admittedly open to criticism, but subsequent research in various countries has substantially confirmed their main conclusions, in particular the view that somewhere around the age of eleven tends to be a turning point in the development of concepts of historical time; it is only after that age, for instance, that the past becomes differentiated into various historical periods. Parallel findings were obtained by Friedman (22), Watts (27) and Gesell (28). Other writers would place the full understanding of chronology even later, especially Hunter (29) who was directly inspired by Oakden and Sturt, and held that up to at least sixteen historical time is subject to foreshortening; Flickinger and Rehage (30) in their summary of available studies suggest that full understanding of time words and dates is not reached until sixteen.

Judging by its content, it seems likely that it was also the work of Oakden and Sturt which suggested to Pistor (31) the construction of a more formal test battery for measuring what he called "time concepts", but are really better described as concepts relating to historical time. Subsequently he used his battery in an attempt to study the effects of teaching, using an experimental versus control group design. One group had received systematic training in both history and geography in the fourth and fifth grades (corresponding age levels about nine and ten). In the sixth grade (age-equivalent about eleven) they received intensive instruction concerned with historical events. Children in the other group had lessons mainly in geography, with little emphasis on history. When tested early in the seventh grade, both groups showed gains in their scores as compared with the sixth grade, but there were no significant group differences. This would seen to suggest that the increase in historical understanding is more a function of mental maturation, coupled with the widening of general experience, than of purely formal teaching. In the absence of other confirmation, such a finding must be treated with some reservation. However, it indicates the need for a broader approach, going beyond the dominant preoccupation with chronology that characterised the foregoing studies.

In recent years there has in fact been an increasing interest in the more qualitative aspects of children's thinking about history, guided by Piaget's theoretical model. Lodwick's investigation, reported by Peel (32), is of this kind. Children aged about eight to fifteen were presented with a well-known story, such as that of Alfred and the cakes, and asked some questions about it. An example would be "Could Alfred cook?" The answers were graded in terms of Piaget's developmental schema into (*a*) intuitive, (*b*) concrete, and (*c*) formal operations. This is not the place for expounding the theoretical basis, but an illustration of each type of answer may be quoted:

(*a*) Yes. (Why?) Because he's the King.
(Can every King cook?). No.
(Why could Alfred cook?) Because he can fight.
(*b*) I shouldn't think so, at least not very well. He didn't pay attention to the cakes; if he had been a cook, he might have known they'd be done.
(*c*) I do not know because if anyone could cook and had something on his mind he might still forget the cakes.

Analysis of the results led to the important finding that children are not uniform in their level of thinking, which is apt to vary from question to question. However, if one categorises each child according to the highest level attained, the developmental sequence postulated by Piaget is largely supported.

The same general conclusion was arrived at in a study by Coltham (33), which is even more directly concerned with historical comprehension. She selected six historical terms frequently encountered in elementary texts, namely "king", "early man", "invasion", "ruler", "trade" and "subject". The understanding of these terms by children nine to eleven years old was explored by means of a wide variety of methods: drawings, verbal definitions, picture choice and construction of models. The combined responses were analysed in accordance with Piaget's stages, referred to above. An illustration will again help to make this clear. The concept of "king" could be assigned to three levels:

(*a*) *King with pomp*—The child drew a king with a throne and similar symbols, also describing the king in this manner. This implies the existence of a single mode of classification: a king is different from other people.

(*b*) *King with power*—Here the king was shown and described as being with other persons exhibiting attitudes of submission. An elementary relationship of authority is thereby portrayed, which is however more complex than (*a*); parent : child = king : other men.

(*c*) *King with power + change*—This is analogous to (*b*), with the crucial addition of the time dimension; e.g. "kings used to have power in olden days but not now". Such mature answers were extremely rare.

On the basis of her findings Coltham suggests that an understanding of historical terms develops at a relatively later age than that of objects which can be directly experienced.

Whilst the developmental studies of children's understanding of chronology and historical terms are an essential ground work, history as a teaching subject does of course go far beyond this. Dates and historical terms are in fact merely the indispensable working tools for opening up wider vistas. The gradual emergence of historical interest and historical consciousness does not appear to have been the subject of much systematic study. A notable exception is the work of Roth (34). His methods were informal and flexible, but ingenious. For instance, in order to assess the extent to which the children valued the past in relation to the present, he asked them how they felt about destroying some historical monuments in their town in order to improve the traffic flow. He reported that by the age of ten some 50 per cent were already in favour of preservation. Or again, when discussing the history of the French people with pre-adolescents, he observed that roughly between nine and twelve the major interest focused on particular persons and events, and such specific characteristics as costumes or habits; a broader historical perspective, coupled with the desire to be fair to the French, was not reached until about thirteen or fourteen. These findings about the unfolding of historical interest are certainly influenced to some extent by educational and cultural factors. Roth was working in Germany, and a parallel study in Britain would be unlikely to yield exactly the same results. On the other hand, it would be surprising if the broad developmental trends were fundamentally different. As no comparably comprehensive picture is as yet available for this country, the work of Roth will be used for part of the summary presented in the next section.

4. Time and History

Any attempt to draw together the threads of a discussion which has ranged over a wide field would be doomed to failure. It is possible, however, to distil a general picture of developmental trends out of the numerous converging research findings which have been surveyed. This is done in Table I, which is largely based on the synthesis worked out by Godin (35).

The left half of the table indicates the stages in the enlargement of "realised time", by this is meant the span of time within which the child is able to orient his actions. Up to about the age of five or six this span is a very narrow one; there is a tendency to "remember things in a simultaneous manner", and to refer them to the single category of "yesterday". Differentiation within this global category is absent or rudimentary, the child being incapable of arranging past sequences of events into their proper order. With increasing age the boundaries of this realised time become extended, and the sequences within it progressively further organised.

A few additional comments concerning time span are necessary. First of all, the ages stated are no more than rough approximations, subject to considerable individual variations; only the broad pattern of development is claimed to be represented. The pattern itself, however, is probably in the main a function of maturation; thus it has been shown that the time horizon of feebleminded is restricted to about ten days, and cannot be much extended by teaching. In this connexion Godin has issued a caution, in line with the thread of the present discussion: "The use of vocabulary of time, learnt by the child, could . . . be misleading." In other words, the learning of the appropriate terms precedes the child's grasp of time relationships, and is therefore an unsafe guide.

The limitations of the right-hand side of the table have already been pointed out, and the trends of historical interest it contains should be viewed as merely tentative. It is to be hoped that similar research in this country will be undertaken to verify these trends. In so far as a certain maturational level regarding time concepts and the understanding of historical terms is a prerequisite for an appreciation of various aspects of history, no striking divergences may be discovered. In particular, such features as the transition from mythological to objective time and the subsequent realisation of historical continuity may well turn out to be universal features in western cultural setting.

TABLE I

Stages in the Development of Concepts of Time and History

Approximate chronological age	*Past which can be present in mind and produce effect*	*Present as time actively employed*	*Anticipated future modifying present action*	*Notions of time and history and progression of historical interest*
5/6 yrs.	Yesterday	To-day	To-morrow	*Mythological Time.* Unfolding in the imagination; tales and stories ("Once upon a time").
7/8	Last week	This day	In a week	
9/10	A month ago	This month	In 30 days	*Objective Time* and possibility of control ("I'll ask my grandfather if it is true"); some like the story to be true, others not.
10/11	In the spring	This summer	In winter	*Contiguity of Past with Present.* Things valued because of their age: respect for ancient monuments—proud to collect old souvenirs, to commemorate the present (photos etc.) for when "one gets old".
Pre-adolescence	Last year	This year	Next year	*Historical Continuity.* Interest in historical sequences develops in following order: biological (seed, plant, harvest); technical (ships, engines); and cultural (period of stage coaches, Bronze age). *Historical Milieu.* Isolated, realistic details placed in their historical framework (interest in museums); historical tales and novels.
Adolescence	Five years ago	This period of life	In five years' time	*Historical Progress.* Continuous development of one person or period. *Beginnings of Historical Interpretation.* Psychological motives of past actions.

Lastly, a brief remark about educational implications may be ventured. This is prompted by the perusal of schemes of work for primary schools, which recommend a "Time chart to about A.D. 600" for children between eight and nine, followed by another to A.D. 1600 for the next higher class, and ending with 1912 for ages eleven to twelve. Two observations seem indicated: first, the age of introducing time charts is, judging by the mass of available evidence, entirely unrealistic, and the conventional wisdom of teachers has gone far astray in this particular instance; second, one reading of developmental studies suggests that it might be more profitable to start from the other end, e.g. "when your mother or grandmother was a child", and work backwards. Possibly some combination of the two approaches would be most effective. However, I realise that it would be advisable to leave the discussion of these issues to those more competent than I am in the educational field.

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able degree this order is imposed by the nature of the concepts themselves. It will also be agreed that most concepts are achieved gradually: for example, a child who can count objects may succeed when they are arranged in a line but have difficulty if they are arranged haphazardly, so that he must re-order them, and if he can do this he may still not use his ability to count when asked which of two apparently unequal groups contains more counters.

In contrast with this ordered development it is doubtful whether a similar hierarchy necessarily exists in other fields. In the case of quantities Piaget (1) has claimed that conservation of substance precedes that of conservation of weight which, in turn, precedes that of conservation of volume as measured by displacement of objects put in water. He suggests that the ages at which these concepts become operational are respectively about six, about eight and about ten years; although the instances he quotes show a variation of several years about each of these approximate means. But his sample was limited, and Lovell and Ogilvie (2), who confirmed his order with respect to substance and quantity, repeated his experiments in one primary school only. Yet consideration of how these concepts are attained might suggest the reverse order of attainment. It is possible to demonstrate to a child who has learned to balance objects that two malleable objects of equal weight still balance in whatever way their shapes are changed or, alternatively, to show that they still balance the same number of ounces or other measures. Play with see-saws and balances may make it possible to appreciate the meaning of this experience at an early age. In the case of substance, however, if the child believes that the amount changes as the shape alters we have no objective test to show him that he is wrong. We may make a verbal appeal, asking whether any substance has been added or removed, but we must wait for accumulation of experience and his own realisation for the concept to be finally achieved. If experience, rather than maturation is the deciding factor, there would appear to be little reason for accepting Piaget's order here. One investigator has already found some contrary evidence: Hyde (3) found among one hundred and forty-four subjects that ninety-eight were at the same stage in concepts of conservation of substance and weight. Of the remainder, twenty-one supported Piaget's order while twenty-five did not. Lovell (4) also stresses the importance of experience. He noted that conservation of weight was more readily understood with familiar materials: children understood conservation of weight of butter sooner than that of plasticine.

With these questions in mind the A.T.C.D.E. Mathematics Section undertook a series of investigations, the first two being into concepts of number and conservation of quantities. In studying concepts of number among infants the aims were to verify Piaget's order of concept attainment and to determine a relative level of difficulty for a diverse sample of children. The level of difficulty of items is, in itself, interesting to teachers, and it was hoped to begin to match items for difficulty for future longitudinal studies. Five lecturers volunteered to organise experiments with the aid of their students. Fairly large samples were provided from four areas: Alnwick (Miss Willis), Coventry (Miss Shuker), Shenstone (Mrs Eyton-Jones) and Redland, Bristol (Miss Sowden). Results for a few children and work in other fields were provided from Hereford (Miss Patton) and Stafford (Miss Grindley).

2. The Tests

Four sets of four items were prepared but, owing to the considerable time taken in individual testing, only the first three sets were attempted by a sufficient number of children to justify reporting the results. The items are identical with, or very similar to, questions asked by Piaget (5). Item I.1 was included partly as a shock absorber and partly in order to relate children's ability to count with success in other items; since it involves the relation of two series—the number names with a collection of beads—it might well have been included in section III. The three sets of items used were as follows:

Section I: *Counting and Conservation*

1. Material: a small box of brightly coloured beads (about 50).

"Show me how well you can count. Count all the beads in that box and tell me how many there are." If the child says that he cannot count so many say "Then count as many as you can."

2. Material: six each of eggs and egg-cups made in cardboard (i.e. as flat pictures).

Place on the table four egg-cups well spaced out. "Four people are going to have eggs for breakfast. These are their egg-cups. Put out enough eggs for them to have one each." Now collect the eggs and lay them close together. "Are there still enough eggs for them to have one each?"

3. Material: a box of twenty beads and a bigger, empty box.

"Here are some beads in a small box. I tip them into a big box. Have I got more beads now, or the same number, or less beads? Why do you think that?" (The child should see into both boxes.)

4. Material: a glass tube (e.g. the kind that some tooth brushes are sold in), a flat dish and some large beads.

"You see this flat dish and the long glass tube? I want you to put one bead in the dish each time I put one in the tube. Do you understand?" (If not, help the child by saying "Put one in the dish. Now I put one in the tube. Put another in the dish. I put another in the tube. Now another . . .") When the tube is full say "Stop. The tube is full. If we both threaded our beads who would have a longer string? Would yours be longer? Or would they both be the same? Or would mine be longer? How do you know?"

Section II: *Correspondence and Composition of Numbers*

1. Material: sixteen "sweets" arranged in two parallel lines (of 7 + 1 and 4 + 4) about an inch apart.

Point to the sweets and say "If you had that line of sweets (7 + 1) and I had that line of sweets to eat (4 + 4) who would have more? How did you know?"

2. Material: a line of twelve counters with spaces of about $\frac{1}{4}$ inch between them. Additional counters.

"Make another line of counters just the same as this one. Make it just here" (pointing to the space between the counters and the child). If asked "The same number?" or "The same length?" repeat "Just the same as this line."

3. Material: a line of eighteen counters spaced as before.

"Can you break up this line of counters into two lines that are just the same?" If necessary repeat "Make these counters into two lines that are just the same as each other."

4. Material: two piles of cubes, one containing 8 and the other 14.

"You see that there are more bricks in this pile than there are in that one. Move some bricks from the big pile into the little one to give two children just the same number to play with."

Section III: *Seriation with Ordinal and Cardinal Concepts*

1. Material: pictures of ten boy scouts (graded in size) and ten sticks (also graded but less tall than the scouts).

Arrange the cards and sticks beforehand, both with the smallest to the left. Place the sticks closer together so that they do not correspond with the scouts. "These scouts are going for a walk and each one is going to take a stick. The smallest boy will take the smallest stick, the next smallest boy will have the next smallest stick, and so on, so that the biggest boy will take the biggest stick. See if you can find me the right stick for this boy (7th). . . . How did you know?"

2. Material: as for 1.

Reverse the order of the sticks leaving the cards as before. "Now see if you can find this boy's stick (5th). The smallest boy will still have the smallest stick and so on. . . . How did you know?"

3. Material: as in 1.

Disarrange both boys and sticks, scattering them at random. "This boy (6th) and the next bigger boy are going for a walk (take the 6th boy and put him in front of the child). Can you find the other boy and both sticks? Be sure you find the right ones. . . . How did you know?" (The last question should only be asked if the child produces boy and sticks without any apparent method.)

4. Material: picture of five telegraph poles connected by single wires.

"This picture shows some telegraph poles. How many poles are there? . . . In between there are some pieces of wire. How many pieces of wire are there? . . . If there was a longer line of twelve poles how many pieces of wire would there be? How do you know?"

Administration of the tests

In general, students were advised to work in pairs, one testing the children while the other recorded their answers. Although the presence of two adults might inhibit some children's responses lecturers felt that the majority of students could not be expected to undertake the whole job alone. Students were instructed to ensure that the child was at ease, talking to him about his home, toys, etc., to fill any unavoidable pause, and praising his efforts from time to time. Each pair of students made the apparatus required and, in some cases, they tried the items on each other before testing the children.

Those who wrote reports were asked to record any question the child asked, comments he made, hesitations observed and his answers, word for word where possible. Additional questions from the tester were also to be recorded. In addition they were asked to state for each child: his age in years and months, his Christian name and his teacher's rating of his intelligence as "Good", "Average" or "Poor".

Students' records varied considerably in calibre. Some were excellent accounts of the child's responses showing that investigator and reporter observed intelligently and fully understood the kind of record required. As an example of an average record a student said of a child's response to item I.4: "Said they would both have the same amount as they each had had the same amount put into them." A few students failed to give essential information, omitting exact ages or any indication of the child's sex, or recording laconically a series of answers, "Passed" or "Same". The majority, however, made good records. One area was unable to give ratings of intelligence for its children. In most cases the students attempted to take four or eight items with the same group of four or five children. In a number of these cases the whole group of children was not tested in the fourth item of a set owing to lack of time; consequently fourth items were used with smaller samples. As the youngest children took longer to test very few were asked to attempt the items in set III.

Results have been omitted from the tables if the answers recorded were difficult to assess, e.g. where the student recorded "hesitated" and nothing more, and in items where children were said to have "passed" without an explanation of the method or reply.

3. THE CHILDREN

The majority of the children ranged in age from four years eleven months to seven years one month. For purposes of comparison they have been divided into four seven-month intervals. As will be seen from the subsequent tables the numbers of children tested differed in each item, so for purposes of comparison results are recorded in percentages. Table I shows the distribution of children by age and intelligence in the five samples where ratings were given. Inevitably children whose surnames only were given are omitted. On the whole the age-groups are comparable, having children of different levels of intelligence distributed in much the same proportion but, if sexes are to be compared, it will be seen that there are too many "Poor" girls in the third age-group and too many "Poor" boys in the fourth.

TABLE I

DISTRIBUTION OF CHILDREN IN FIVE SAMPLES

		I				II				III			
Girls		1	2	3	4	1	2	3	4	1	2	3	4
4·10	G	4	4	4	2	4	2	2	2	–	–	–	–
–	A	7	6	7	4	5	3	3	3	1	1	1	1
5·5	P	5	3	4	2	–	–	–	–	–	–	–	–
5·6	G	5	5	6	5	4	4	3	3	2	2	1	–
–	A	11	8	8	7	8	10	6	4	4	5	3	2
6·0	P	2	2	1	1	1	1	1	–	2	1	1	1
6·1	G	3	2	3	3	4	3	3	3	3	3	2	2
–	A	9	10	10	2	8	12	9	2	5	5	5	5
6·7	P	6	6	5	1	4	4	4	3	3	3	3	3
6·8	G	7	8	7	4	8	7	8	5	6	5	4	4
–	A	12	21	17	14	16	15	16	10	15	12	10	12
7·2	P	–	1	–	–	2	1	1	1	1	–	–	–
Boys													
4·10	G	4	4	3	2	4	2	2	2	–	–	–	–
–	A	4	2	3	4	3	1	1	1	1	1	–	–
5·5	P	–	–	–	2	–	–	–	–	–	–	–	–
5·6	G	4	3	3	5	4	4	4	3	2	2	2	1
–	A	7	6	5	7	8	9	9	6	3	3	3	4
6·0	P	6	3	4	–	4	3	2	2	1	1	1	–
6·1	G	5	4	6	1	6	5	5	3	4	4	4	3
–	A	12	11	12	8	11	12	13	10	7	8	6	4
6·7	P	–	–	1	–	–	1	–	–	–	–	–	–
6·8	G	7	7	6	5	6	6	7	6	5	3	3	4
–	A	6	6	6	4	11	9	9	7	4	4	2	2
7·2	P	10	10	9	8	6	7	5	6	5	4	3	3

4. RESULTS

(a) *Relative difficulty of the items*

To determine the relative difficulty of the items the number passing each was expressed as a percentage and the items were listed in order of decreasing percentage of successes. As few younger children had attempted the items in section III the youngest group was omitted for this purpose; their inclusion alters the order of only two almost equally difficult items (II.2 and 3) in the first two sections.

The order is then as follows:

		Total Number	*% passing*
I.2	Conservation (eggs and cups)	150	85·3
II.2	12 counters to copy	157	77·6
II.3	18 counters to divide into equal parts	143	75·5
I.3	Conservation (beads in two boxes)	154	70·1
II.4	Equalising 14 and 8 bricks	107	64·5
III.1	Relating series (boys and sticks)	80	60·0
I.4	Conservation (beads in tube and dish)	123	56·1
I.1	Counting beads (to 40)	166	52·7
III.4	Relating series (poles and wires)	53	51·0
III.2	Relating series (boys and reversed sticks)	72	50·0
II.1	Comparing 7 + 1 with 4 + 4 sweets	155	38·1
III.3	Relating series, both series disarranged	60	16·7

Where differences between items are small it will be appreciated that in comparable samples collected elsewhere the items might well appear in a different order. But the difference between the first two items (I.2 and II.2) is significant and, throughout the list, a difference of some ten to fifteen per cent indicates a significant difference in difficulty level.

Failure or success in each item is determined primarily by the child's use of some perceptual method which does not take account of all factors involved as opposed to the use of a method of reasoning such a matching or counting. As we look down the list we see evidence of increasing use of perception as contrasted with logical thinking.

More important, we can deduce the order of difficulty of different kinds of items; and this, we shall see, substantially confirms the order which Piaget asserts must occur in the acquisition of number concepts.

(*b*) *Comparison with Piaget's results*

Firstly, as maintained by Piaget, the easiest item is one in which there is a one–one correspondence with closely linked elements (eggs and cups). Here, as he claims, the link between the items is closer for a child than when a glass is merely put opposite a bottle or when two rows of counters are matched (5, p. 49). In this item the one–one correspondence is imposed by the elements themselves.

Following this comes a second group of items which may be solved by means of one–one correspondence, and the item dealing with conservation of number of beads transferred from one box to another. To match twelve, to equalise fourteen and eight, or to halve eighteen may be worked in many ways; numerous methods of matching, matching with counting, or counting and calculating were employed. This may account for the small differences between age groups which we shall see later; there is some method avaliable to most infants. The similar level of difficulty of the conservation item is of interest. Piaget suggests that the notion of conservation involves decomposition into elements (5, p. 31); he contrasted understanding of conservation of discrete objects with conservation of continuous quantitities (liquids) and found the former was achieved first. The item in which beads are poured from box to box allows no counting, but it does not seem unreasonable to suppose that children must be able to count before they realise the conservation in this case—even if it is a generalisation, as it probably is, from having counted a few items such as marbles or pennies before and after changing their container.

A third group of items involve matching of two series, viz. the easier questions of set III and relating numbers with forty objects. Here also a conservation item is included; this is the hardest one, in which beads are matched in pairs into a tube and a dish. Piaget believes his experiments show that the finding of a one–one correspondence between series amounts to the same thing as the construction of a single series (5, p. 99). This we can neither confirm nor deny for the fourth set of questions, on the making of series, was attempted by too few children. But recent work by students in Birmingham suggests that the making of a single series is the easier task. The matching of series shows a further development in that counting is now a commonly used method and, in some cases, is essential to success. However, a few children select the right stick for a scout without any evidence of counting, and continue to do so however the series are moved in relation to each other. Either they count and do not admit it or intuitive, or matching, methods are possible with only ten pairs of objects. Among those who do count a frequent error occurs among Piaget's subjects in that the (n-1)th stick is matched to the nth, boy. This arises from counting the boys before the one to be matched, remembering this number, and counting to it, and no further, in selecting the matching stick. In our sample, a number of older children (who are most likely to use counting) get these items wrong. These are the cases of which Piaget says they lack understanding of the necessary bond between a given position and the corresponding cardinal number (5, p. 151). That the third item on conservation is included in this set shows that for about half the children the idea of conservation is not yet operational. Although this is a one–one correspondence it is never visually presented as such; this time the child is not aided in imagining the matched lines of beads which could be made. To realise it he must be able to draw on experience such as threading successive sixes of beads of different colours, or to have reached a more advanced stage of understanding in which he can say immediately that the same numbers of identical beads make identical length.

The two most difficult items involve operations with numbers or objects in which intuition alone cannot suffice and in which simple one–one correspondence no longer serves. To equate 7 and 1 with 4 and 4 children must count or match, relating the parts with the whole in some fashion. This item is classified by Piaget under "additive composition" of numbers in which he includes subtraction and the relation between the parts and their sum (5, p. 199). This relationship was appreciated by the child who answered "Hole, hole, same." Though possibly verbally limited he had grasped the situation as subtraction of one unit from a whole (of nine) in each case. Many others proceeded in the more conventional way of summing the parts or counting the items in each line. Inevitably some errors were made in counting. It is of interest that Piaget classed equalising fourteen and eight and dividing eighteen into two equal parts with this item (5, p. 191). These can, of course, be attempted by means of adding or subtracting numbers, but it is an exceptional child who chooses such a method. The children we tested used primarily methods of matching, and in most items used more varied methods than Piaget records. For this item Piaget suggests that children must be "over seven" to succeed. In our sample about one-third of the children in our three younger groups succeeded, and about half in the oldest age group.

Lastly, as we should expect the disordered series provide by far the most difficult item. Many children here admitted that they did not know how to proceed; others selected scout and sticks "intuitively"—and it sometimes happened that these were the right ones. In assessing results only those whose method was logical were counted correct. Here again the bond between the cardinal number and position is not appreciated to the extent that the child realises that he must remake the series, at least partly, and perhaps in imagination only, to regain the order (5, p. 151).

It is possible throughout to indicate a sequence of development from a perceptual method resulting in failure, through intuitive matching which does not suffice if the correspondence is broken or in more complex situations, to the operational level at which the concept is fully understood. Piaget has distinguished stages in this way in his book on number (5) and has not assigned children's responses to overall periods of development as he has done in some later work. When "stages" are so distinguished they occur at different times for different concepts or for different children. It is only the order which is invariable. With this order we are substantially in agreement.

There is insufficient space to give a detailed analysis of the results by chronological age, intelligence ratings, or sex. It must suffice to say that on the whole there was a steady improvement in each item with age in the first two sections but that there were items (I.2, and II.3, and III.1, 2 and 3) in which all age groups did about equally well. Sudden improvements by children in one age group were unusual: there is some evidence of marked improvement in II.2 at 6 years, in II.1 and III.4 at 6½ years and, less pronounced, in I.3 at 5½ years. On the whole children rated as having good intelligence did better in everything; but compared with other children they found it easier to divide eighteen equally than to understand the question relating to eggs and cups. It was easier for them to match series but they found it relatively more difficult than most children to answer the question as to whether the number of beads was conserved when transferred from box to box. The least able group invariably did less well than the others but, taking this into account, they found it easier to match two series of objects than to match twelve counters or to divide eighteen counters equally. Possibly this is because they found counting more difficult. It seems that they favoured matching and intuitive methods, using counting less frequently than the other groups. It is possible also that they prefer objects, such as scouts and sticks, which have some bearing on their experience to counters which make no appeal to familiar situations.

Two further points deserve mention. First, children differed to some degree in the order in which they understood concepts. Some could count fluently to a hundred or more but failed in simple conservation; by contrast, a child who could not count accurately to twenty succeeded in every other item. Several children could match the disarranged series, realising that they must be re-made, but failed in easier items, e.g. recognising 7 + 1 and 4 + 4 as equal groups, or matching two series when one was reversed. Children could be found who succeeded in only the hardest, or two harder, conservation items. Such diversity could be accounted for by differences in experience and, possibly, by innate differences between children in their abilities. Secondly, there was greater variety in the kind of answer given than Piaget describes. It would be tedious to enumerate the kinds of answers for each item but it may be of interest to see the many solutions to the problem of equalising piles of 14 and 8 blocks. Among our sample ten successful methods were found. In order of frequency these were (1) moved some, counted, moved more, counted and so on until correct (25%); (2) counted all and divided by 2 (12%); (3) made lines of equal length or height (10%); (4) mixed all together and shared out (7½%); (5) counted out in pairs, sharing the last pair (6½%); (6) matched without lining up, then counted (3 children); (7) pushed three over saying "I can see" (3 children); (8) counted first then checked by heights of piles (1 child); (9) divided the 8 into two fours, then shared the 14 one by one (2 children); (10) made squares of nine blocks and added to these (1 child). There was as great variety between those who failed (30%). Possibly the great diversity of work in English infants' schools and the scope given for free play contributes to this variety and individuality of approach.

5. CONCLUSIONS

The following are the main conclusions suggested by these results:

1. The order of achievement of number concepts closely followed that found by Piaget and Szeminska (5).

2. In the first two sections there was, in general, an increase in number of successes with age. In the easiest conservation item there was little or no improvement with age, and in matching series all three age groups did about equally well. A probable explanation is that experiences of matching and grading are not sufficiently frequent in the upper part of these infants' schools.

3. There is more clear-cut progress with intelligence, as rated by teachers. But items I.2, 3, II.4, and III.2 proved more difficult to those rated "Good" than to those rated "Average". The most able group solved problems more readily. The least able tended to

prefer intuitive methods to counting even among the older age-groups.

4. Sex differences were not found to be significant, but older boys and girls were not well matched for intelligence. There were significant differences in favour of girls, who excelled in matching eggs and cups and in matching dolls with sticks, whereas boys were significantly better in understanding conservation of beads poured from one box to another, and in seeing the equality of 7 and 1 and 4 and 4 sweets. It may be that these differences arise from differences in play.

5. In solving "problems" there was greater diversity of method than was reported by Piaget and Szeminska.

6. Children differed a little in the order in which they achieved number concepts and more considerably in the order in which they understood any one concept in different situations.

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AN EXPERIMENT IN PROGRAMMED INSTRUCTION: JUNIOR SCHOOL SCIENCE

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PROGRAMMED learning, the basis of the teaching machine movement, is a technique of instruction founded on certain psychological principles. These principles were discovered in laboratory studies of animal and human learning and the teaching machine movement is an attempt to apply laboratory techniques in the normal classroom situation. Programmed instruction is not only this, however. The teaching techniques of the great teachers, past and present, have been examined and their methods show close similarity to the principles discussed in the laboratory. The theoretical basis of programmed instruction is, therefore, a synthesis of psychological principles and good teaching practice.

1. UNDERLYING PSYCHOLOGICAL PRINCIPLES

It is possible to give only a very brief and simplified account of the underlying psychology of programming in an article of this nature. It is necessary to state that there is still no general agreement on the principles or laws of learning, even though many years of research have been spent investigating the problem. The following is a simplified account of Skinner's position (14).

Psychologists have always been interested in the way in which an organism changes its behaviour according to changes in its environment. They have always been interested in learning.

In the laboratory the psychologist is faced with his first major problem—the problem of communication: how to teach and what to teach to a dumb animal. He has resolved this problem by devising a physical arrangement by means of which the animal is forced to behave in a certain way, e.g. maze-running, escaping from a puzzle box. Once the animal has behaved in this way the psychologist cannot be sure that it would repeat the behaviour at a later date in the same situation. This problem is solved by a system of rewards and punishments. If the psychologist rewards the animal after a behaviour sequence, in future it tends to behave in the way that led to the reward. This is the Principle of Reinforcement; by rewarding the animal the experimenter is reinforcing the sequence of behaviour. The reward normally given to an animal is food or drink. It is sufficient reward for a human subject to know that his response is a correct one.

To be most effective in behavioural control, reinforcement should come as soon as possible after the emitted behaviour. It is possible to say, then, that behaviour is learned only when it has been emitted and reinforced promptly.

The second major principle discovered is that reward is more conducive to learning than is punishment. A large number of correct responses is necessary because making mistakes is punishing. After repeated failure the subject becomes frustrated, motivation is lost and the subject will eventually lose interest and leave the field.

In both human and animal learning, complex repertoires of behaviour are best accomplished by gradual progression by a system of successive approximations. This is one of the major principles on which programmed instruction depends. It enables the student to be correct as often as possible and is the fastest way to build up complex behaviour.

A gradual elimination of stimulus support is important for speed and ease of learning. In the early stages of learning a behaviour sequence, cues and prompts are used to aid the subject. These are gradually withdrawn until the subject can respond correctly without them. In programming technique this is known as "fading" or "vanishing".

Responses emitted by the subject must as far as possible be overt and not covert. In the classroom situation the student's responses are generally covert; his role, as far as overt behaviour is concerned, is passive rather than active.

To teach abstract concepts many examples must be provided, each having the common property of the concept to be learned; but among the examples there must be a range of other properties. The programmer teaching abstractions builds up "webs of association" by using a wide range of examples in a form of modified repetition.

One final principle is of great importance to the technique of programming. In the laboratory, the rat, the pigeon or the human being control the behaviour of the psychologist almost as much as he controls theirs. The programmer is also under the students' control. Errors made during the use of a programme are an indication of its deficiences and the programme must be reconstructed accordingly. In effect, the students are writing the programme.

2. Teaching Technique

Good teaching techniques go back in history to Socrates and beyond, and programmed instruction is based on good teaching practice. Many American authorities affirm that the programming of a body of knowledge is an essential part of a teacher's training. The following are suggestions to indicate the methods used by the good teacher to present a body of knowledge to his pupils. The programmer tries to build these features into his programme.

1. The good teacher has a clearly defined aim.
2. He tries to analyse the subject matter into the smallest possible steps.
3. He presents these steps in a logical sequence.
4. He ensures that the student responds overtly.
5. He responds in turn to the pupil.
6. He allows the pupil to move at his own learning pace.
7. He asks leading questions and builds up meaning with "webs of association".
8. He notes the student's questions, steers him clear of errors and provides constant guidance.

An examination of the instructional process shows that it consists basically of three elements interacting in a system of control and communication. These are the teacher, the student and the body of knowledge. The teacher is the controller and communicator. For optimum efficiency the best control and communication system is between one pupil and one teacher. This was Rousseau's ideal, hitherto impossible in practice. In the classroom the number of systems depends upon the size of the class. The teacher can at best see individual students only briefly during the day. Programmed instruction is a method of giving each child individual attention.

Traditional reinforcing techniques are inadequate. A child completes an exercise, his book is collected and marked; it is a matter of hours and sometimes days before he receives his reinforcement. Programmed instruction ensures that the student receives the reinforcement immediately. Porter and Skinner quote some interesting figures. Porter (1) says that a class of thirty children learning to spell ten words in a twenty-minute lesson need to be reinforced 4,500 times, or 225 times a minute. Skinner calculates that in the first four years of a child's learning mathematics he needs contingencies of reinforcement of the order of 50,000—in the traditional system he receives a few thousand contingencies. He concludes that the teacher, as a reinforcing agent, is out of date and that the answer lies in the use of an automated device.

3. THE TEACHING MACHINE

The machine is essentially a labour saving device. The machine itself does not teach, it is the vehicle by means of which the work of one teacher is brought to an indefinite number of students. It must be efficient in use, simple to operate and it must fulfil certain requirements.

1. It must first display or present the material of the programme in accordance with the type of material and the method of programming. In a typical machine the display panel is simply a slot in the top of the machine through which the student can read the material one step at a time.

2. There must be facilities for the student to make his response. This again depends upon the programme. The student may be required to compose his answer, make a choice from a multiple choice series or simply press the correct button.

3. When the student has made his response he must be made aware of its correctness or incorrectness. This is known technically as "feedback". The simplest type of feedback is direct comparison with the correct answer. It is sufficient to say that it must be simple to operate, immediate and obvious.

4. A record of the student's progress through the programme must be kept. Typically it is a paper tape on which the student has written or typed his response.

Machines used vary from the simple cardboard slider to complicated electronic devices. Some machines make provision for "branching". Most programmes are "linear"; that is, they move step by step from the beginning to the end. In a "branching" programme if the student makes an error the machine automatically branches; it leaves the main course of the programme and goes to another part which gives a simpler and fuller explanation of the error. This is obviously more efficient as the better students are able to go through the programme linearly, and the poorer students come to really understand the programme because they have the benefit of fuller explanation.

4. General Programming Technique

Programming is a skill about which very little is known. The programme is best written by a person who knows children and the way in which they learn, and who has a good command of his subject matter. It has been indicated above that the good teacher programmes his teaching automatically; it seems reasonable to conclude, therefore, that teachers will be the best programmers.

Programming techniques vary from individual to individual, and certain limitations are placed on technique by the nature of the material to be programmed. The first stage in the programming technique is to decide the criterion or "terminal behaviour", i.e. the knowledge to be learned and how that knowledge is to be used. Usually the object is to provide the student with some knowledge skill which he will be able to express in his own words and use in a new situation. Once this has been determined the programmer decides upon the level of attainment of the students who will be using the programme. These two, the criterion behaviour and present attainment, provide the framework within which he must work. It may be necessary to lead in the programme with additional items.

The next step is to prepare an outline or scheme of work which will cover the material to be taught. The use of orthodox test-books is recommended and also the help of some specialist in the subject. The body of knowledge is then divided into a series of "frames", each of these being a small step forward towards the criterion behaviour. The frame plan is usually (i) to present information, and (ii) to ask a question to which the student responds.

The size of step should be small. The programmer should start by assuming that the student possesses the barest minimum of the information to be taught and that only small pieces of information should be presented in each frame. Size of step does not depend upon speed of working: it relates to the complexity of what is being taught. It is probably better to put in too many steps rather than too few, but care must be taken to ensure that the programme does not become so trivial that it reduces motivation. It is true also that motivation may be lost because the steps are too large, thus reducing the incidence of reinforcement.

Each frame should as far as possible fit in with those preceding and succeeding it. This is the principle of "dovetailing". If upon examination it appears that contiguous frames do not dovetail, it may be necessary, by rearrangement of context or by inserting new frames, to make them do so.

Dovetailing brings out meaning to a certain extent, but the use of modified repetition is also a useful programming device for this purpose. The same material can be introduced again in the programme in a different context. This repetition generalises the knowledge to be learned.

Correct responses must be encouraged and prompts or cues can be used as an aid to the student. Gradually the prompts must be taken away. They are "vanished" so that the response is eventually made without them.

The programmer should make frequent use of review frames. These emphasise the important facts and rules presented and consolidate the desired behaviour. It is also wise to conclude the programme with a series of review frames which test the material presented. This is a valuable way of discovering whether the programme has, in fact, brought about the terminal behaviour.

The last step in the process is a most important one. The programme is tried on a representative sample of students. The response sheet of each student is examined and the number of errors noted. This error rate determines where the programme needs reconstructing.

5. An Experimental Programme

Bearing in mind the above considerations, it was decided to write an experimental programme to teach science, the precise topic being "The air around us". The object was to present a knowledge of the properties of air, its necessity for the continuation of life and of the breathing process. The programme was to be suitable for higher junior and lower secondary school children of average intelligence, having the ability to read well.

It was decided that the programme would take the form of a programmed text with cardboard slider. Multiple choice and constructed answers were to be used and the programme was to be projected in two parts of fifty frames each. The programme was to be linear and would make use of prompts and cues, the vanishing technique and the "ruleg" principle.

It was decided that the contents of the programme would be as follows:

1. Air is everywhere.
2. Air is a substance.
3. The atmosphere is a layer of air.
4. A vacuum is nothing.
5. Bellows action, for extension later to lung action.
6. Man's need for air.
7. All living things need air.
8. Air is a mixture of gases.
9. The importance of oxygen.
10. Nitrogen as the other main gas.
11. Oxygen is used in burning and breathing.
12. Food is converted into energy.
13. Inhalation of oxygen: the elements of the breathing process.
14. The heart, lungs and bloodstream.
15. Exhalation of carbon dioxide.

The programme was limited in size because it was to be used for research purposes, therefore air-pressure, convection currents, the weather, etc. were omitted. During the programming an attempt was made to knit the concepts listed above in a logical sequence using the techniques mentioned earlier.

Specimen frames are shown in Table I which illustrate the following programming techniques:

TABLE I

SPECIMEN FRAMES

Frame Number	*Content*	*Correct Answer*
62	One of the main gases in the air is OXYGEN. When we breathe it is OXYGEN we really need. We use the OX.......... in the air when we breathe. 1. Hydrogen; 2. Neon; 3. Oxygen; 4. Nitrogen; 5. Argon.	3

TABLE I

Specimen Frames

Frame Number	*Contents*	*Correct Answer*
63	Complete this sentence. (Write the word.) One of the main gases in the air is o–yg–n.	oxygen
64	Complete this sentence. When we breathe it is o........... we really need.	oxygen
65	Complete this sentence. We use the .... in the air when we breathe.	oxygen
66	Oxygen is used in breathing by all living things. Without it they would die. Which of these need oxygen? 1. houses; 2. works; 3. people; 4. pens; 5. papers.	3
67	Which of these need oxygen? 1. chimneys; 2. trains; 3. machines; 4. children; 5. wheels.	4
68	Which of these need oxygen? 1. pigs; 2. pencils; 3. desks; 4. bricks; 5. chalk.	1
69	Which of these need oxygen? 1. stones; 2. pens; 3. cupboards; 4. fish; 5. dusters.	4
70	PLANTS ARE LIVING THINGS. Which of these need oxygen? 1. sand; 2. trees; 3. rocks; 4. windows; 5. doors.	2

(i) Linear programming: The subject matter is presented in a series of frames, divided so that the size of the steps between frames is uniform and small.

(ii) Prompts and cues: An example of the prompt occurs in *Frame 62* above. OXYGEN is printed in large type twice before the response is made. A cue in the same frame is OX........... in the question. In *Frame 63* the cue is the partly written word O-yg-n which the child completes in the response.

(iii) Vanishing: In *Frames 62-65* the cues are removed, gradually freeing the student from dependence on them.

63. O-YG-N.
64. OX..........
65. ....

(iv) Ruleg Principle: This is a system of cue removal in which the rule is first described.

Frame 26: "One of the main gases in the air is OXYGEN. When we breathe it is the OXYGEN we really need."

This is followed by an example to be completed.

Frame 62: "We use the OX.......... in the air when we breathe."

It is then stated incompletely with the child required to complete it.

Frame 63: "One of the main gases in the air is O-YG-N."

Frame 64: "When we breathe it is OX.......... we really need."

6. PILOT STUDY

After the first writing the programme was 100 frames long. This was duplicated on foolscap paper, 10 frames to a page, and used in the pilot study.

The objects of this initial study were:

(i) To give some guidance to procedure when the main experiment was conducted.

(ii) To test the programme and make an analysis of error rate for re-writing.

(iii) To determine the amount of time required for completion of the programme.

(iv) To discover a relationship between intelligence as measured by a standardised test (Schonell Essential: Form A) and number of errors made.

The subjects were twenty children in a co-educational secondary modern school. Their average age was twelve years, and average I.Q. 104·9. They had a mixed artisan and lower middle class socio-economic background, and were new to programmed instruction. These children were learning science but had not been taught the programmed topic.

The whole of the pilot study required three 45-minute sessions separated by intervals of one week. In the first session frames 1-50 of the programme were given, and in the second session frames 51-100. The third session was used to give the intelligence test.

In each of the first two sessions each child was given a copy of the programme, a cut-out cardboard slider, and a prepared response sheet. The method of working was demonstrated with a programme pinned to the black-board. A "four-step" procedure was emphasised:

(i) Read the frame and write your answer.
(ii) Move the slider down to reveal the correct answer and the next frame.
(iii) Mark your own answer.
(iv) Go on to the next frame.

When the children completed the assignment they brought their work to the front and the time taken, to the nearest minute, was entered on their paper.

Since this pilot sample was so small it was impossible to draw any sound conclusions from the results, but the experiment brought out the following points:

(i) The procedure for the introduction of programming as a technique was adequate.
(ii) The "machine" worked well.
(iii) Many more frames could be completed in each session. The majority of the children could have completed the whole programme in 45 minutes.
(iv) The children were questioned orally about their attitude to this method of teaching, and as a result it was decided to include an attitude test in the main experiment.

7. Rewriting the Programme

A note of every error and its type was made on a copy of the programme and an examination of these showed in many cases why they had been made. Every error was considered to be important, including those which fell in frames not scheduled for rewriting.

Some criterion measure was needed to determine which frames came into the rewriting category, and it was decided to use a 10% error rate. Thus any frame which had two or more errors in the pilot study was to be reconstructed. The twenty-three frames which needed this were spread evenly throughout the programme; and some of these errors were caused by inadequate programming in earlier frames. This meant that the whole programme needed careful reassessment and rewriting.

Examples of programming errors were as follows:

(i) *Frame 6*

Is an empty box really empty?

1. Yes, 2. Could be, 3. No, 4. Might be, 5. Do not know.

25% wrote 1. Yes—this was the logical answer as the box was described as "empty" in the question.

(ii) *Frame 9*

When we are riding a bicycle we are riding on air and it saves us from bumping too hard. Is this

1. true or 2. false?

25% said 2. false—This frame was separated by 5 frames from a previous one which asked "What does a bicycle pump put into bicycle tyres." No child made an error on that frame.

(iii) *Frame 16*

We can make a completely empty space by pumping the air from a container. The completely empty space is called a VACUUM. A vacuum is ....?

1. something, 2. air, 3. nothing, 4. full, 5. container.

25% wrote 5. container—The concept of "nothingness" had been introduced too quickly—the children could see only a container.

(iv) *Frame 27*

Air is a mixture of gases. There are two main gases in the air. How many main gases does air contain?

1. one, 2. three, 3. two, 4. four, 5. six.

25% answered 2. three—obviously a case of number confusion.

(v) *Frame 60*

The air we breathe out is a mixture of gases, oxygen, and nitrogen, but it also contains two other substances—WATER VAPOUR AND CARBON DIOXIDE. As far as we are concerned the CARBON DIOXIDE is the most important. Some of the oxygen has been replaced by ....

1. Nitrogen, 2. Smoke, 3. Carbon dioxide, 4. Argon, 5. Helium.

25% replied 1. Nitrogen. This frame contained too much information and was very involved.

The rewritten programme was 200 frames long. Most of the frames in the original programme were multiple choice: only six of them required a constructed answer. These were put in to determine whether the children found it difficult to change their mode to answering. There was no evidence of any difficulty, therefore in the rewritten form of the programme multiple choice questions and constructed answers were mixed more freely. There were 127 multiple choice and 73 constructed answer frames. This had the effect of lifting restrictions on the programming and allowed for much more modified repetition of the frames—something which the original programme lacked.

8. The Main Experiment

(*a*) *Design and Procedure*

The presence of individual differences in school performance is so obvious as to have become traditionally one of the primary concerns of educational psychology. When programmed instruction is used, are individual differences unimportant or do they become more important? What variables are likely to be effected? The completed programme was used to investigate this problem, and the individual differences selected for study were: intelligence as measured by a standardised test (Schonell Essential); speed of working; social class as measured by father's occupation; ordinal position in family; family size; age; sex; attitude.

The subjects were 121 children of average age 10+ years, in three co-educational junior schools situated in three contrasting areas of a large city. The first school was located in a very poor working class district, the second on a new council house estate on the outskirts of the city, and the third in a suburban middle class area.

The experimental procedure was basically that used in the pilot study, with the following differences:

(i) The programme was now 200 frames long, and was projected 100 frames in two separate hours.

(ii) An attitude test was given.

(iii) The time spent in each school was limited to two mornings.

(iv) Information was obtained regarding family size, etc., as indicated above.

Using an electronic computer,* means, standard deviations and inter-correlations were obtained for all the measures obtained.

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* Acknowledgments are due to Mr H. J. Hallworth, who wrote the Mercury computer programmes.

(*b*) *Results*

The experiment was principally concerned with five variables: mental age, speed of working, number of errors, age, and attitude. Other variables were introduced to serve as a check on the results obtained for the main variables.

The more intelligent children made fewer errors on the programme than the less intelligent (the correlation was −·525). This confirms earlier findings and indicates that this particular programme is not "intelligence-free". The more intelligent children also worked at a faster rate (−·555), and more errors were made by the children taking a longer time over the programme (+·467).

On the whole a positive attitude was shown towards programming as a teaching technique, but the more intelligent children showed a less positive attitude. It is probable that the programme lacked motivation for the more intelligent: the repetition of items was not as varied and interesting as it ought to have been. A further rewriting will attempt to remedy this.

The experiment was conducted with only one year of the junior range and therefore age range was limited. Age correlated significantly with only one other variable, sex (+·417): the girls tended to be older than the boys. Sex was also correlated with time of working (−·251): the girls took less time over the programme than the boys.

The results obtained for the other variables were all in the expected direction. The child's social class position was determined from father's occupation, and it was found that the children of higher social class were also the more intelligent children in the sample, they made fewer errors and took less time than those lower in the social scale.

Children from large families tended to be less intelligent than those from small families (−·310), and children with a low ordinal position in the family were also less intelligent. There was no significant correlation between family size and ordinal position on the one hand and error rate on the other, but children from larger families and later in ordinal position took longer to complete the programme.

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RELIGIOUS CONCEPT AND RELIGIOUS ATTITUDES

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PART I

The measurement of religious attitudes has been a frequent exercise of some American psychologists since Thurstone and Chave first introduced a technique of precise attitude measurement in 1931, illustrating it with a scale for measuring "Attitude to the Church". A considerable measure of agreement is to be found between the many subsequent studies made of religious attitudes, even though their value is restricted by the fact that most of them have used university students as their subjects. The striking differences that can be observed between contrasted religious groups are depicted in the attitude scores; use of the same tests over a long period has shown a trend to more favourable attitudes which corresponds with the substantial increase in church-going in America over the same period. At any given time, older students at the end of their courses tend to be more liberal than younger students beginning their studies; "liberal" in this context usually implies a tendency to abandon more orthodox beliefs and replace them with humanistic or agnostic ideas. This is in general agreement with the detailed survey of such studies made by Argyle, who notes a marked tendency for a reduction of religious activity in adolescence in many subjects. This he regards as "an important and little known phenomenon" and he comments that adolescence "is not a time of heightened activity as has often been supposed, it is a time of decision. The longitudinal studies of conversion only tell us about those who decide to become religious. It would be expected that those who become irreligious make their decisions at about the same time. Since the two sets of decisions take place in opposite directions simultaneously, both are concealed in cross-sectional averages" (1). Whether the drift from religious belief which seems to be characteristic of many adolescents is to be described as deciding to become irreligious does not alter Argyle's point.

In considering the religious attitudes of secondary school children in this country, the considerable differences in age, ability, and cultural background between these children and American students must not be overlooked. Similar trends may be expected rather than close agreement.

Before modern techniques of attitude measurement were available studies were made about the relative popularity of school subjects with school children. The pre-war investigations of R. A. Pritchard (2) and J. J. Shakespeare (3) placed religious instruction at almost the bottom of the list at every count. It is not surprising that in later studies of children's attitudes little attention has been paid to religious attitude. The principal exceptions are to be found in the work of W. Glassey (4), F. E. Moreton (5), J. F. Forrester (6), J. W. Daines (7), J.B. Bradbury (8), and D. S. Wright (9). These shed much light on some aspects of the problem, but they suffer from several limitations. Many were concerned only with grammar school children; not all used precise techniques of attitude measurement, and their frames of reference differ considerably. Nor are all of them based on reliable statistical analysis. At crucial points there are serious divergences between them; for example, some find a marked loss of attitude favourable to religion with increasing age as one moves into senior forms of secondary schools, while others find no significant change of this nature at all. Any study of children's religious attitudes must therefore meet two fundamental demands; first, scales are needed that can be shown to be reliable by rigorous testing; secondly a sample of adequate size and representation must be tested to establish the nature of such attitude change beyond reasonable doubt. This was the first objective of the study to be described.

In the first place, several "equal-appearing interval" attitude scales were constructed in the manner pioneered by L. L. Thurstone (10). In such scales, the subject merely indicates his agreement or disagreement with the statements given. The statements were based on a considerable number of opinions about religion made by a wide variety of schoolchildren. Five different scales were constructed, dealing with attitude to God, to the Bible, to "Religion", to the Church as an institution and to the Church as known locally in the subject's experience. After preliminary refinement, based on the responses of 150 boys, the test was given to a representative group of 500 children, whose responses to 91 separate items were analysed in detail. The most important aspect of this analysis proved to be the construction of the graph of the operating characteristic of each item. The respondents are divided into a series of groups, all members of a group having the same total attitude score. Against each score interval is plotted the proportion of the group accepting the particular item. The method is described by Edwards (11).

By these means, many doubtful items were discarded, leaving a much smaller number known to be discriminating and unambigious to the respondents. From these a simpler set of tests were constructed; fewer items were included, but to each item five possible responses were given—agree strongly, agree, not certain, disagree, disagree strongly. The test in this form was readministered to yet another group of children, and the responses subjected to further examination. Only those which gave reliable statistical evidence of clearly discriminating between more positive and less positive attitudes were retained, and the latter were then examined by Guttman's method of scalogram analysis. The result consisted of a test of 34 items, which between them comprised six separate attitude scales: attitudes to God, the Bible, "Religion", and three different attitude scales for attitude to the church—one regarding the Church as an institution, a second regarding the Church as a known local community, and a third, which only became apparent by the scalogram analysis, an attitude to Church-going. Subsequent re-examination of the tests after their use by more than 2,000 children has demonstrated the closest agreement with these earlier results, except in insignificant details.

The final test, as it has been developed, comprises 33 items which cover six related aspects of religious attitude. These six subscales correlate strongly:

		(ii)	(iii)	(iv)	(v)	(vi)
Attitude to God	(i)	·555	·906	·782	·866	·784
Attitude to the Bible	(ii)		·586	·625	·506	·489
Attitude to Religion	(iii)			·798	·845	·778
Attitude to the Church	(iv)				·777	·763
Attitude to the Local Church	(v)					·862
Attitude to Church-going	(vi)					

The tests can be used as two major tests, the first a general scale for attitude to religion, the second, a scale for attitude to the church. Thus scored the correlation between the two scales is $r = \cdot 830$.

Test reliability can be calculated conveniently in two ways. A maximum reliability coefficient can be secured from the "split-half" coefficient of correlation, in which responses to alternate items are compared with responses to the rest. A minimum reliability coefficient can be calculated from the formula

$$r = \frac{n}{n - 1} \quad \frac{\sigma^2 - pq}{\sigma^2}$$

where n is the number of items in the test
p is the proportion of correct responses to each item
q is the proportion of incorrect responses to each item
σ is the standard deviation of the whole test

Maximum and minimum test reliability for the two major scales, calculated in these ways on the basis of 510 responses from 14 and 15-year-old-children are shown to be as follows:

	Maximum Test Reliability	*Minimum Test Reliability*
Attitude to Religion	·923	·902
Attitude to the Church	·921	·915
Total Scale	·956	·949

Finally, the test may be used to compare changes in attitude over a period; 17 of the 33 items are used for a first test, and the remaining 16 are used for a second test. When given at the same time, the scores of the same 510 children gave a correlation for test-retest $r = ·917$.

The scales are as follows: responses italicised score one point, so that the score range is from 0 to 33 on the total test: items marked I distinguish the first test, when so used, from the re-test items, marked II. It should be noted that higher scores indicate more favourable attitudes to religion.

	Agree Strongly	*Agree*	*Not Certain*	*Disagree*	*Disagree Strongly*	
I	A.S.	A.	N.C.	*D.*	*D.S.*	I find it difficult to believe in God, because there are no real proofs
II	A.S.	A.	N.C.	D.	*D.S.*	I dislike the word "God" and all that goes with it
I	*A.S.*	*A.*	N.C.	D.	D.S.	The idea of God means much to me
II	A.S.	A.	N.C.	D.	*D.S.*	Belief in God has no interest for me
I	A.S.	A.	N.C.	D.	*D.S.*	It seems to make very little difference whether I believe in God or not

	Agree Strongly	*Agree*	*Not Certain*	*Disagree*	*Disagree Strongly*	
I	A.S.	A.	N.C.	D.	*D.S.*	It is a waste of time to read the Bible
II	A.S.	A.	N.C.	D.	*D.S.*	The Bible is a very boring book
I	A.S.	A.	N.C.	D.	*D.S.*	I do not read the Bible because it is out of date
II	*A.S.*	A.	N.C.	D.	D.S.	The more I understand the Bible, the more help I get from it
I	A.S.	A.	N.C.	D.	*D.S.*	I fail to see any connexion between the Bible and my own life
II	*A.S.*	*A.*	N.C.	D.	D.S.	I only know a little about the Bible, but it has helped me to believe in God
I	A.S.	A.	N.C.	D.	*D.S.*	I hate anything to do with religion
II	*A.S.*	*A.*	*N.C.*	D.	D.S.	Religion is as needful for my soul as food is for my body
I	A.S.	A.	N.C.	D.	*D.S.*	Religion has no meaning for the world to-day
II	*A.S.*	*A.*	N.C.	D.	D.S.	My religion is a source of great joy
I	*A.S.*	*A.*	N.C.	D.	D.S.	Religion is an essential part of man's being
II	*A.S.*	*A.*	N.C.	D.	D.S.	The Church upholds the spirit and teaching of Jesus, and deserves my loyal support
I	A.S.	A.	N.C.	*D.*	*D.S.*	Church services may help some people, but they do not help me
II	A.S.	A.	N.C.	D.	*D.S.*	I think the Church is stupid and futile
I	A.S.	A.	N.C.	D.	*D.S.*	I doubt if the Church fulfils any useful purpose
II	A.S.	A.	N.C.	D.	*D.S.*	I believe that the Church is hopelessly out of date
I	A.S.	A.	N.C.	D.	*D.S.*	It seems absurd to me for thinking people to go to Church
II	*A.S.*	*A.*	N.C.	D.	D.S.	If I do not attend Church I feel that something is missing
I	*A.S.*	*A.*	*N.C.*	D.	D.S.	My Church is the best influence in my life
II	A.S.	A.	*N.C.*	*D.*	*D.S.*	Church services always bore me, and are difficult to follow
I	*A.S.*	*A.*	*N.C.*	D.	D.S.	My Church has my highest loyalty and respect
II	A.S.	A.	N.C.	*D.*	*D.S.*	I like going to Church, because I get something worthwhile to think about
I	*A.S.*	*A.*	*N.C.*	D.	D.S.	I regard the Church as the most important thing in the world, outside my home

	Agree Strongly	*Agree*	*Not Certain*	*Disagree*	*Disagree Strongly*	
II	A.S.	A.	N.C.	*D.*	*D.S.*	Going to Church makes me feel sad and gloomy
I	A.S.	A.	N.C.	*D.*	*D.S.*	Most Church-goers seem to me to be narrow-minded and kill-joys
II	*A.S.*	*A.*	*N.C.*	D.	D.S.	I believe you must belong to a Church to live life at its best
I	*A.S.*	*A.*	N.C.	D.	D.S.	I believe the Church has the greatest influence for right living
II	*A.S.*	*A.*	N.C.	D.	D.S.	I go to Church because I feel better for having done so

If the scales are to be used for any comparative purposes, some adjustment in scores is needed. Between Scale I and Scale II the mean scores of 510 children differ very little, 7·900 and 7·910. But the mean score of the same group on the Attitude to Religion Scale is only 6·894 compared with 8·916 on the Attitude to the Church Scale. The simplest method of adjustment is to use *T* scores, and these are given below, based on the responses of the same group of 510 children.

	T Scores			
No. of valid responses	*Scale I*	*Scale II*	*Attitude to Religion*	*Attitude to Church*
0	32	32	34	31
1	37	37	39	36
2	40	40	42	39
3	43	42	44	42
4	45	43	46	43
5	46	45	48	45
6	48	47	49	46
7	49	48	51	47
8	50	49	52	48
9	52	51	53	49
10	54	53	55	50
11	55	54	57	52
12	56	56	59	54
13	58	59	60	55
14	60	62	63	57
15	62	67	66	60
16	65	73	72	64
17	71	—	—	70

With a scale of adequate reliability, it then became possible to seek evidence about children's religious attitudes. In order for comparisons to be made with confidence, it was decided to limit the initial use to four schools only, but to test all the children of these schools, as far as was possible. A boys' and a girls' grammar school, drawing their children from approximately the same area, consented to give the tests, as did a boys' and a girls' modern school whose children alike came from the same area, in this case mostly of privately owned semi-detached houses. In each school the head teacher was known to attach great importance to the religious life of the school, and in every school there was a specialist member of staff for religious instruction. Altogether, 1,977 children were tested, 1,035 boys and 942 girls.

When mean attitude scores for the age-groups are examined, few significant differences can be observed. Girls show a mean score of 7·29 compared with boys' 6·11 (with maximum score 16) on the scale of attitude to religion, and in the scale of attitude to church girls' mean score 10·43 compared with boys' 8·25. The only age-group which differs significantly from the average is that of the first form boys, on the attitude to the church scale; if this is overlooked, in all other cases significance tests show that the identity of score is itself significant. However, scores for individual forms show a much greater divergence, and the standard deviation for scores increases with age. A parallel study on children's religious behaviour had shown that frequency of church attendance tended to be associated with other scores. Accordingly, the attitudes of the present groups of children, made up of 68 separate forms, were calculated also for each group of each form who professed to attend church at least once a month, and for each group who professed to attend church less than once a month. (This dichotomy can be shown to be much less arbitrary than it appears; behavioural studies of the same children whose attitudes are here discussed indicated that these two separate categories tend to be quite clearly defined.)

Presented in this form, the development and changes of religious attitudes at once show a striking and meaningful pattern which clearly indicates the reason for previous uncertainties regarding such changes. While attitudes more favourable to religion always tend to be associated with girls in the sample rather than boys, they are always seen to be associated with the church-going children, whose attitude scores remain remarkably constant during the whole period investigated. The children who do not attend church with regularity (and in the present sample there is a trend for church-going to fall off in the older age-groups) show a regular decline in religious attitude scores over the whole age-range tested, as can be clearly seen from Tables I and II.

TABLE I

ATTITUDE TO RELIGION

Attitude scores of adolescent boys and girls

Mean Age	*Church-going boys*	*Church-going girls*	*Non-church-going boys*	*Non-church-going girls*
11·6	8·38	8·26	7·36	7·68
12·6	6·50	8·76	5·69	6·21
13·6	6·77	7·88	4·89	4·84
14·6	7·13	8·48	2·88	5·07
15·6	6·53	8·31	2·31	5·80
16·6	7·14	8·70	3·27	3·34

TABLE II

ATTITUDE TO THE CHURCH

Attitude scores of adolescent boys and girls

Mean Age	*Church-going boys*	*Church-going girls*	*Non-church-going boys*	*Non-church-going girls*
11·6	12·07	12·47	8·87	10·60
12·6	9·64	12·23	7·36	8·72
13·6	10·05	11·77	6·59	7·62
14·6	10·69	12·27	4·47	7·23
15·6	9·00	12·48	3·44	6·49
16·6	9·88	12·11	4·50	7·77

In interpreting these scores it must not be forgotten that while the first four age-groups cover all streams, those for the 15·6 age-group include only those children from Modern schools who have elected to remain at school beyond the statutory period, while the final group is that of the sixth forms of the two schools tested with such forms. It would be foolish to expect very close similarities in what become smaller groups; even so, the straight line regressions of these results are statistically significant, and the deviations lie within the area of chance that must always be tolerated.

Significance tests show that the changes of attitude scores with age are not significant in the church-going groups, but highly significant in the non-church-going groups, and that in each set of scores, all regressions on age are significantly different from the others, excepting for those of non-church-going boys and non-church-going girls, which do not significantly differ.

Thus the reason for the previous uncertainties in the earlier studies can at once be seen; the scores of any particular group of boys or girls will depend considerably on the extent to which a larger or smaller proportion of the group are church-going; the presence or absence of a larger proportion of older non-church-going children obviously will radically affect results.

Of great importance is the meaningful pattern of development which the results indicate. Argyle (1) has marshalled a good deal of previously extant evidence on religious changes in adolescence, and used it to show that adolescence is a time of religious choice, a choice that is continuously spread over much of the secondary school life of children. Here is clear support for this point of view. At no age is there any significant increase in attitude scores among the church-going, despite the literature regarding 'age of conversion'. In the questionnaire used an independent question was asked "During the past year have you become more or less interested in religion" and opportunity given for replies on a seven point scale. Results suggest that the interested, at every age in the sample, say they are becoming more interested, and once more there is no age of peak interest development. Sudden attitude changes, as in typical conversion, appear to be rare in this sample. But on the other hand, the regularity by which positive attitudes are discarded by those in the non-church-going groups adds considerable substance to Argyle's description of adolescence as a time of religious decision.

Beyond this observation the present article cannot go. Religious attitudes are associated with church-going, but the evidence here discussed sheds no light on whether continued church attendance maintains favourable religious attitudes, or whether on the other hand church attendance is the result of the motivation of a religious attitude. Formal church-going does not necessarily sustain a religious attitude, since the behavioural studies indicated that many children who attended church in the earlier years of secondary education had dropped the habit within a few years. An adequate discussion of the origins of a religious attitude lies outside the scope of the present article and reference must be made to the author's thesis (12).

(*To be concluded*)

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THE PSYCHOLOGICAL ASPECTS OF THE CHANGING STRUCTURE AND NEEDS OF THE FAMILY*

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1. INTRODUCTION

It used to be thought that rising standards of health and material prosperity would lead to a reduction in the incidence of maladjustment, backwardness and delinquency among children and adolescents. To some extent this expectation proved to be correct. For example, children whose parents have been rehoused do better at school than those who are still living in congested, and often condemned, property and the rate of delinquency is higher in slum areas than on well-established housing estates. Yet maladjustment and juvenile delinquency continue to be serious social problems. Similarly, prisons are overcrowded and half the available hospital accommodation is filled with patients suffering from various kinds of psycho-somatic or mental illness. Of course statistics on these problems can be very misleading if accepted at their face value; only interpretation can elucidate their real significance. Yet changing conditions make such interpretation very difficult. The aftermath of the second world war, a rise in the birth rate and more efficient methods of detection have probably all contributed to what appears to be a rise in the juvenile crime rate; similarly, the setting up of various treatment centres for maladjusted children may have led to a greater awareness of this condition. It may also be that the rise in standards of health and material prosperity are of too recent origin and not as yet widespread enough, to show an appreciable amelioration in the incidence of social maladjustment or maladaptation. And lastly, it may be that economic and social improvement do not necessarily solve these problems; they make satisfactory family and community life possible, but cannot ensure it. That a general rise in material standards will not of itself abolish these social and emotional problems is strongly suggested by the high incidence of violent juvenile crime and the high consumption of tranquillisers in the most affluent of modern societies, the United States.

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The last fifty years have seen tremendous changes in the scientific and economic fields which have had far reaching repercussions on the psychological climate of the time. These changes seem to be of an unprecedented magnitude and to be taking place at a great speed, affecting all aspects of everyday life. They make very considerable demands on the adaptive powers of adults and tend to produce anxiety, since all change implies some threat to security. Yet if the challenge of the technological and social revolution is to be met successfully, deeper individual security is needed. Because it is no longer possible to bring up children with a clear idea or image of the kind of world they will have to live in—since few would dare to hazard a prediction regarding life even twenty or thirty years hence—it is all the more important to enable them at least to grow up emotionally secure as well as adaptable. Before discussing the ways in which the structure and the needs of the family have been changing, it is necessary first to discuss the psychological functions of the family.

2. THE PSYCHOLOGICAL FUNCTIONS OF THE FAMILY

By outlining first the role of the family in the personality development of the child, it will become apparent how needs, expectations and behaviour patterns are handed on from one generation to the next. We may then inquire whether these traditional ways are still applicable in the light of changing social conditions.

The basic and all-pervasive feature of parental love is that the child is valued for his own sake. In their relationship with him, the loving father and mother communicate affection through all their ways of dealing with him. The greatest impact of such love is on the development of "the self". Approval and acceptance by others are essential for the growth of self-approval and self-acceptance. Whether a child develops a constructive or destructive attitude to himself and to other people depends in the first place on the parents' attitude to him. In the dependency relationship of the child to the mother, later to the father, siblings and then to other people, is to be seen the primary socialising pattern, the task of learning to become a human being.

Mothering to begin with ensures survival of the baby but the complete indulgence of all its wants is changed gradually into a series of regulatory pressures. The main means of education open to the parents are the reward of love or the refusal of it (implied in punishment or frustration). It is within the family circle that the child receives his first experience of emotion: of love and hate, of irritation and anger, of co-operation and unselfishness. Not only will his most intense feelings be centring around his father and mother, but for years to come he will model his behaviour on theirs. The attitudes acquired in these first years tend to colour his subsequent social attitudes and expectations; and the structure of discipline and authority in the family both reflects and helps to determine the climate of a society. Where this structure is marked by security, recognition and respect for the individual's rights and duties, the foundation is laid for later democratic functioning.

Regardless of culture, religion, custom and tradition, the basis of all human relationships is love, mutual respect and understanding. In a list of environmental factors which influence emotional development and hence the growth of human relationships, the first and foremost place must be assigned to the family. It is within the family circle that emotional and social learning begins, long before the child has any conscious awareness of himself and others. During infancy the home is in almost complete control of his joys and sorrows; parental harmony or discord cast their spell upon him long before he understands any of the words spoken around him; parental precepts and example start to condition his feelings and attitudes long before the conscious and deliberate teachings of other institutions of society (such as the school) reach the child.

In the same way, it is within the family that, during early childhood, the basis is laid for later social and educational success. In the happy united home, an interest will be taken in and every encouragement given to the child's first experiments in learning, be it trying to walk or talk. By their delight in his efforts and progress, the parents elicit continued trial and learning. The good home also provides an ever-increasing background of experiences which familiarise the child with gradually widening aspects of his environment, be they physical, social or cultural. Thus the family satisfies what are considered to be children's most important needs: the need for security, the need for emotional response from others and he need for new experiences.

Of course the family fulfils important psychological functions also with regard to its adult members. It could be argued that their needs are very similar to those mentioned above: marriage meets the need for a stable, secure relationship in which each partner is valued for his own sake and receives emotional response and support from the other; making a home and (for most couples) raising children provides the joy of new and shared experiences. In addition, the needs for recognition, independence and for responsibility find satisfaction within the family group for adults and children alike, although other groups in society make a vital contribution there (such as the school, daily work, etc). Needless to say, all these psychic needs are closely interrelated and the growth of mental stability and intellectual development depend upon their satisfaction at each state from infancy to adolescence and into adulthood. The order in which they have been mentioned indicates their relative importance during childhood. Security and affection are the essential needs of infancy; if they are not fully met, as in the case of children deprived of normal family life, there is a poor foundation for later personality development. New experiences remain throughout life the "mental food" required for intellectual growth. The needs for recognition and independence become increasingly important as the child grows older.

There is one further factor, almost as fundamental as any of the others mentioned previously. This is the need to play. If denied the opportunity to play, the child's whole mental growth will be stunted. During the pre-school years play is the major psychological means through which he begins to understand his surroundings, to learn about the physical attributes of the world, to appreciate causality and to come to terms with his emotions. In play the child can safely experience and experiment with the whole range of emotional expression without himself or others coming to harm. As he grows older, his play becomes more social and through it he learns to communicate and to co-operate with others by subordinating his self-centred, immature desires and thoughts to the interests and views of others.

In conclusion, the family gives a sense of security, of companionship and belonging to each of its members; it also bestows a sense of purpose and direction, of achievement and of personal worthwhileness. For the child, it is of unique importance because it mediates between him and the world at large, providing what has been called "a buffer, a filter and a bridge". It thus fulfils the irreplaceable function of laying the basis for the adjustment of the individual within society. The capacity for integration, co-operation and creativity has its roots in family living.

3. The Changing Structure of the Family

The factors making for change in our civilisation intimately affect the whole structure of family life. Though it is difficult to observe change while being a part of the changing scene, the more salient trends are discernible. Some of these are related to modern conditions of living and work; some to the emancipation of women and family planning; and some to new ideas about child rearing and education.

There is an increasing tendency for people to move into towns and tall flats are often replacing the small family house and garden. As cities grow and geographical mobility increases, journeys to and from work lengthen; thus shortening hours of work do not necessarily lead to the father having more time available in the evenings to be with his wife and children. Suburbs or blocks of flats do not as readily constitute a living community as did the village or small town. Social mobility is also militating against local attachment and proximity to relatives and family friends since families move house more often. Although established suburbs often develop some form of community life they do not usually integrate the whole family as a unit but rather cater for special interests (sport, politics), one sex only or certain age groups.

Next, it is no longer possible for most children to observe at first hand most of the basic processes needed for life and the work which supports their society. From being a production centre, the home has become a "service station" into which things come ready made, processed, tinned or frozen. It is difficult for boys to identify themselves with their father's role as breadwinner when they have only the vaguest ideas of what he actually does (except if he is a milkman, postman, pilot, shopkeeper, teacher or belongs to the few other occupations which are readily observable or otherwise easily understood). For most girls it is still much easier to identify themselves with the feminine role even where their mothers go out to work.

Now to turn to the second group of factors which are making for change in family life: the progressive emancipation of women is having a direct and increasing effect on the structure of family life. The equalising of opportunities open to men and women has led to marked changes in the relations between the sexes; most women work before marriage and many continue to do so afterwards. The experience of economic and personal independence through earning their living, leads to some conflict between desire for this independence and the claims of domesticity and maternity. This is heightened by the economic need for women workers and an over-materialistic outlook on life which make it appear desirable and praiseworthy for a woman to continue paid work outside her home despite family ties. To some extent this undermines the role of the father as wage earner, head of the household and authority figure. The apparent loss of status of the man and the increased self-confidence of the wage-earning woman inevitably have psychological consequences on the emotional climate of the family. Being able through her earnings to provide various comforts for the house (easy chairs, carpets, T.V. and the like) on the one hand makes the home more attractive, so that it becomes more a centre for family living; on the other hand, housework remains to be done in the evenings and so husbands tend to share to an increasing extent domestic chores and the care of the children.

The emancipation of women may also, to some extent at least, be linked with the increase in the divorce rate. This increase could well be more apparent than real: not only was divorce socially much more frowned upon in the past, but the vast majority of wives depended solely on their husband's financial support. Greatly increased educational and vocational training for women, together with the availability of legal aid, may now lead more women to break a matrimonial union which previously they would have had to endure. There is little evidence to show that such an actual break is more harmful to the children than a home broken in spirit through constant quarrels and dissension.

Family planning and a reduction in the average number of children may also be linked with the emancipation of women. This has been accompanied by a change in the composition of the average family: in the past there were not only more children, but grandparents, uncles, aunts and cousins often lived within visiting distance; thus the children gained first-hand experience not only of the very young but also of the old. The small modern family no longer provides this wide range of emotional relationships but instead family ties tend to be closer and more intense. There has also been a change in the evaluation of the age groups and in the relations between them. Instead of age carrying the prestige of wisdom, it is now considered a problem; thanks to medical advances life has been prolonged but small flats are not conducive to the harmonious living together of three generations. Childhood and youth, on the other hand, have become periods in their own right and the subject of much study; as a result the young are no longer thought to be merely incomplete adults.

Now to turn to the third group of factors making for change in family life: new ideas about child-rearing have made their influence felt in the past thirty years or more. The impetus for this change has come from studies of both normal and exceptional children. But, as tends to happen with new ideas, they have been over-stated or misinterpreted (e.g. sex education being confused with mere instruction; or sensible discipline being abandoned due to misinterpreting Freudian teaching on the harmful effects of conflict and frustration—harmful only if the conflict is insoluble and the frustration inappropriate). Moreover, when parents have to unlearn some of the attitudes instilled into them through their own upbringing, they may well feel uncertain and insecure. This is likely to lead to parental anxiety and inconsistency. The conditions of present-day life also tend to intensify adult anxiety and uncertainty. To mention just a few: the increasing emphasis on economic competition; rapid and major scientific and technological developments such as atomic science and automation; a change in social and moral standards developing in the aftermath of a world war and a social revolution. If parents suffer from feelings of uncertainty, conflict and doubt, these feelings are likely to be communicated to their children. The most stable and "emotionally tough" may be able to resist the effects of an atmosphere laden with anxiety; the rest will —to a greater or lesser extent—become predisposed or conditioned to emotional instability or maladjustment.

Recent research work in the field of juvenile delinquency has produced statistical support for this supposition. The greatest "crime proneness" was found to be associated with that birth group who passed through their fifth year either during the depression of the 1930s or during the second world war. Scientific evidence is also accumulating about the most vulnerable periods of childhood and about the effects not only of maternal, but of paternal deprivation and of socio-economic conditions. These findings give scientific proof to the evidence of case histories with which social workers, psychologists and teachers are only too familiar; showing that matrimonial harmony and a happy, secure and dependable family life are the basis for children's emotional security and stability; conversely, that maladjustment, delinquency and school failure are closely associated with the broken home, with parental inconsistency and disharmony and with rejection of the child.

The last factor to be mentioned which is having an effect on family structure, is the steadily lengthening period of formal education and the fact that scholastic achievement rather than wealth is becoming the gateway to professional and social advancement. Similarly, as the organisation and processes of industry grow constantly more complicated, minds and hands with more developed skills are needed. The consequences for the family are twofold: there is the seed of conflict—particularly of standards and of loyalties—when children's educational level and occupational aspirations surpass to a high degree those of their parents. Secondly, there is a steady prolongation of children's economic dependence as facilities for technical, vocational and university education increase. This coincides with the earlier attainment of puberty. The delay of achieving adult status when physical adulthood has been reached is likely to be all the more frustrating when the "psychological distance" between the generations is wider than ever before.

4. THE CHANGING NEEDS OF THE FAMILY

During the past fifty years great strides have been made in improving material standards of life, including physical health. Better still, there is now an emphasis on the prevention of physical ills and material deprivation. The same cannot unfortunately be said regarding the preservation of mental health and the prevention of psychological deprivation. Lip service is frequently paid to the importance of a stable, harmonious family life and to the role played by parents in laying the foundations for a child's emotional adjustment and educational success. Yet rarely are the practical consequences of this view considered, and more rarely still are steps taken to translate theory into practice.

In what follows the changing needs of the family will be considered from the point of view of each of its members, firstly the mother's. In the process of emancipation, girls have been given the same educational opportunities as boys. Putting masculine ideals before growing girls carries the implication that the domestic and maternal role is somehow inferior. This view is later made explicit in Government appeals for the labour of married women, in press pronouncements and through the mass media of entertainment where work outside the home is compared favourably with being "merely a housewife and mother"; economic factors are also responsible for the persuasive pressures directed at married women to undertake outside work. They are thus being conditioned to feel a sense of waste and dissatisfaction with the traditional feminine role of home-making and child-bearing. It may well be that for a small minority the daily stimulation of outside work is essential for mental stability and satisfaction. But for the great majority it is likely that bringing up children and looking after husband and home, is not only a full-time but also a satisfying task.

Has the time not come when it is necessary to restore in the mind of growing girls as well as in the public mind the unique importance which mothering has for the mental health of young children? There is now ample research to support the view that pre-school children thrive best physically, emotionally and intellectually when they are given the almost exclusive attention of their mother or a dependable, stable mother-substitute. The best children's nursery is but a poor substitute. It is urgent to bring about a change in the climate of opinion so that mothers of young children feel confident and aware of doing a creative and most essential job rather than apologetic because they are "full-time mothers". Moreover, financial encouragement (possibly in the form of increased family allowances for pre-school children) should be given to mothers of young children so that they do not need to seek employment outside the home because of economic need. In the long run this will prove considerably cheaper than providing facilities for difficult adolescents, be they maladjusted, delinquent, school failures or unemployable.

On the other hand, the modern educated mother, living in cramped suburban surroundings with her small children, needs a regular respite from her family which in days gone by could be provided by relatives living nearby. It should not be an impossible feat of organisation for nursery schools to make provision for pre-school children to be looked after for half a day once or twice a week. Similarly, nursery school provision (to be distinguished from creches or day nurseries) is not an educational luxury but fulfils an important function in the education of three-to-six-year-olds living under cramped urban conditions. Again, once all their children go to school, many mothers—thanks to better educational opportunities and better health bestowed by modern advances—may feel the need to develop interests of their own outside the home. They may wish to resume a career given up at marriage or child-bearing, but on a part-time basis, or to undertake some training if previously they had none. For either of these eventualities, too few opportunities exist at present (at least in some countries), especially if the mother considers that she ought to be with her children before they leave in the morning, on their return from school and during most of the school holidays. Greater flexibility will be required of industry, commerce and the professions if working mothers are to make their optimum contribution without neglecting their family responsibilities.

Next, in what ways are the needs of fathers changing? The satisfaction and security derived from possessing a craft and from having some responsibility, is increasingly denied to large sections of the working population. The challenge and joy of vocational involvement has perhaps never been available to the majority, but now—except for the professions—is available to only a small minority. Being a readily replaceable cog in the industrial machinery deprives the individual of a sense of identity and of personal value. To a considerable extent this loss can be restored to the breadwinner by the family. Fathers can make an indispensable contribution to the psychological development of their children, daughters as well as sons. The importance of the mother-child relationship has been so much stressed in recent years that it almost seemed fathers need merely to provide material things for their offspring. As so often happens, work with handicapped children has shown how mistaken this view is. Where fathers share responsibility for the upbringing and care of a handicapped child his chances of triumphing over limitations are much greater than if the mother is left to cope single-handed. The same is now seen to apply also to the normal child.

It is from and through the father that the entire family should receive a steadiness of purpose, an enthusiasm of interest, a sense of justice, an awareness of the world's problems and an inspiration to become a participant in making it a better place to live in. Through a living partnership with their wives, fathers can place before their children an example of democratic and co-operative leadership which the sons will seek to emulate and the daughters will wish to find in their future husbands. By taking some part in their children's care, finding time to play with them, later to share interests with them, fathers can enjoy and get to know them from their earliest age; delegating all care to the mother until the children are older prevents the building up of those early relationships, which are of such vital importance, and makes the father feel a stranger in his own home. It is within the family that fathers can—through being valued and needed—gain a sense of stability, personal worthiness and belonging.

Lastly, in what ways are the needs of children changing? In a world uncertain of its values, standards and even of its survival, the child's need for security is greater than ever before. Only if he finds stability, harmony and love within the family; only if reasonable, consistent and predictable demands are made on him which are appropriate to his age and stage of development; only if anxiety and frustration are kept to the necessary minimum; only then is he likely to develop the resilience and powers of adjustment required of adults in this increasingly complex and increasingly threatening world. It is also now being recognised that children's capacity to benefit from increased educational opportunities depends as much, if not more, on parental encouragement and support than it does on sheer intelligence.

The larger and even more fundamental question of how to instil in the future generation a sense of moral responsibility and a sense of values, which give meaning and purpose to life, is not the province of the psychologist but rather of the philosopher or theologian. But there can be little doubt that healthy emotional and intellectual growth of children is based on the child's feeling that he is loved and valued for his own sake and that this love is dependable, consistent and unconditional. The smaller the family, the more dependent is the child on such love from the parents and the greater is his vulnerability in the face of loss—be it death, desertion or divorce.

Children can cope with or at least tolerate a good deal of strain and tension, if their environment provides rich possibilities for all kinds of play. From earliest babyhood until at least the age of seven years, play is the major psychological means by which learning proceeds not only in the intellectual but also in the emotional and social spheres. But congested urban conditions with too small houses or flats, small gardens, if any, and dangerously busy roads, severely restrict the space and freedom for unsupervised play. Conversely, children who are allowed to roam about freely, find themselves far too readily in conflict with the law through curiosity and a sense of adventure. Making adequate provision for both indoor and outdoor playing space and facilities should not be considered a luxury. High priority must be given to it by town planners since it is one of the vital means of preserving the mental health of growing children.

Despite the marked changes that have taken place in sex roles and the relations between the sexes, sex differences are still emphasised along the same traditional patterns. It is likely that the continuation of this conventional sex typing, which starts at quite an early age, leads to confusion and uncertainty in adolescence and later: boys find men's jobs invaded by women and see their masculine role of wage earner and authority figure threatened; girls face a conflict between the security and status conferred by marriage and maternity on the one hand and on the other the desire for economic and personal independence conferred by a job. Children need to be prepared much more clearly and realistically for their future roles as parents and citizens. While increasing educational opportunities should be given to girls, particularly at the professional level, at the same time they also need more systematic guidance for their future roles as homemakers. At best such guidance comes from the happy, harmonious home where a satisfactory solution has been worked out; but the schools, youth organisations and media of mass communication all have a part to play in shaping public opinion to accept these changing conditions. If girls need help in seeing how they can make a specifically feminine contribution complementary to that of men, boys must also come to see their part as husbands and fathers in a new light.

Lastly, to turn to the specifically educational needs of children: with industrial development and automation, the simpler repetitive processes are being taken over by machines and by electronic "brains". This leads to fewer jobs for those of limited intelligence or poor educational standard. Conversely the demand for well-trained technicians and technologists is likely to increase. Thus schooling tends to be prolonged with an emphasis on intellectual learning. Moreover, intelligent children from working class and lower middle class homes may have considerable difficulty in reconciling new norms of thought and behaviour put before them in school with what is accepted in their home and immediate group of relations and friends. This conflict, together with longer dependence on parental, financial support during a time when the desire for independence, for adult sex experiences and for a philosophy of life are strong, has practical implications for home and school alike. Adolescents need help to understand and work through these problems to avoid rebellion, at present tending to take ugly and violent forms, against all adult authority and standards.

5. A SUGGESTION FOR MEETING SOME OF THE PSYCHOLOGICAL NEEDS OF THE CONTEMPORARY FAMILY

To ensure that in our complex and changing society more children grow up in the most favourable emotional and educational environment, it might help if there were available a comprehensive service or agency which is both preventive and curative. For want of a better name it might be called a family advisory service. There are several reasons why such a service seems now more urgently needed than thirty or forty years ago; perhaps chief among them is the fact that moral, religious and social standards are in the melting pot, making for parental doubts, fears and uncertainties; also during this century a beginning has been made in the systematic and scientific study of children's emotional and educational development, but, as nearly always in science, application lags at present behind discovery.

This suggested Family Advisory Service should have six functions which are briefly listed below.

1. *Education:* to co-ordinate the available facilities for the dissemination of knowledge regarding children's emotional, social and educational needs; and, where necessary, to create such facilities for normal families by arranging lecture courses, discussion groups, etc.
2. *Prevention:* to make available to the usually self-reliant family a service to help them through periods of temporary strain and crisis.
3. "*Cure*": to give help to the many families suffering from some degree of defective family relationships at the earliest possible time.
4. *Long-term support:* to provide more or less continuous guidance to inadequate families to prevent a complete break-up of the home. At present no public agency can officially take action until the family fails to function as an acceptable social unit.
5. *Clearing house:* many different agencies or services are available at present to advise on various problems of normal and handicapped children. For lack of knowledge on the part of parents, these are often not used at all or too late. The Family Advisory Service would be competent to suggest the most appropriate specialist or body to consult in a particular case.
6. *Research:* though this may sound utopian at present, eventually this service might sponsor research, if not undertaking some

itself. For certain kinds of studies it would have quite unique opportunities, for example long-term follow-up projects of chronic problem families and the sort of parents their children eventually become.

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BOOK NOTICES

A. M. CARR-SAUNDERS, *New Universities Overseas* (Allen and Unwin, 1961, pp. 260).

R. G. MACMILLAN *et al.* (eds.), *Education and our Expanding Horizons* (University of Natal Press, 1962, pp. 534).

HERE are two books, of very different character and quality, concerned with education in parts of the world where European civilisation has intruded in the form of colonialism and which now seek to enter the modern world as industrial and politically independent states. Education is a major instrument of these twin aims.

One illuminating view of the recent history, including the educational history, of colonial and ex-colonial countries is that which sees them as the latest extension of those two great convulsions in European history, the French (political) and the industrial (English) revolutions. Of these perhaps, the second is the more fundamental in that the expansionist character of industrialism has brought the whole world within its compass and has generated problems of cultural transmission and diffusion—the passing on and the spread of science and technology—which dominate the politics as well as the economics of the new nations. Higher education with its promise for economic growth as the source of high scientific and professional manpower is accordingly of great moment in these countries. But it is also of direct relevance to political life as a natural carrier of those beliefs in human dignity and the rights of individual opportunity which come down to us from the French revolution. Both Sir Alexander Carr-Saunder's book on the development of university education since 1946 in the British colonial territories, and the proceedings of a conference on education at the University of Natal which make up the South African book, may be considered as commentaries on the extension of the historical revolution of economic and political life in Europe.

New Universities Overseas is unquestionably the better book. It is a serious and painstaking account of that essay in progressive post-colonialism, the Asquith doctrine, and is indeed a powerful apologia for the Asquith principles as set out in the Commissions report in 1945. (In a sentence these were to create universities in the colonial territories along the lines of the development of the "provincial-colonial" colleges at Leicester, Hull, Exeter, etc.). Not all will agree with Sir Alexander's defence of Asquithism. Some will feel that he brushes aside too easily the relevance of the American land grant college movement as an alternative model and some might properly complain that, given the paramount importance of the contribution of education to economic growth, the model of Russian educational development since 1917 merited discussion as a second alternative. Nevertheless this book is a valuable and instructive addition to our knowledge of educational development outside Europe.

The Natal book is by contrast a collection of largely ephemeral pieces. They range from a vivid popular statement of the population problem by Julian Huxley, through papers on marriage, delinquency, the role of the classics, and the therapeutic value of physical education, to accounts of different kinds of school and college in South Africa. English readers will perhaps turn with most interest to those chapters which give information on the development of education for the coloured and Negro inhabitants of the Union of South Africa. There is surprisingly little to be found and still less of comfort. Liberal protest in the spirit of the European revolutions is voiced for example by the headmaster of a primary school. "We are educating not human beings, not South African citizens, but Coloured people, Africans, Indians and Whites. Each is being educated for a different society within the same state." But the South African "establishment" view was put by the Governor-General, a Mr C. R. Swart, who opened the Conference by asserting the odious doctrine of white supremacy and the moral inferiority of the natives who, if robbed of the civilising care of the gentle white South Africa, would immediately revert to an orgy of arson, rioting, rape, cannibalism and mutual extermination. The title reference of the book to "expanding horizons" is a pathetic irony in a country where the government has turned its back on those elements in European tradition which, elsewhere in Africa and Asia, hold out whatever hope there is for a better world.

A. H. HALSEY

J. G. CROWTHER, *Scientists of the Industrial Revolution* (The Cresset Press, London, 1962, pp. 365, 35s.).

F. SHERWOOD TAYLOR, *Science Past and Present* (Mercury Books No. 33, London, 1962 (first published in 1945), pp. 368, 12s. 6d.).

STANLEY D. BECK, *The Simplicity of Science* (Penguin Books Ltd., Harmondsworth, 1962 (first published in the U.S.A. in 1959), pp. 293, 4s.).

THE author of *Scientists of the Industrial Revolution* has written some thirty books on various aspects of science. The volume under review completes a series of five in which the progress of British science "has been viewed through biographies of a succession of leading figures in its creation".

The enterprise is laudable, for the history of science, when presented as the activity of human beings in their social environment, can be a respectable discipline of interest and value to the layman, to the scientist and to the man of letters. The growth of this discipline, though slower in this country than in many others, is striking, and its contribution as a bridge between diverging interests could well be a major factor in preventing a deplorable lack of communication between two traditions.

Those who are familiar with Mr Crowther's work, and they are many, will expect a polarisation of view in his writings. For this some readers will make allowances, others will applaud. There are three main ways of regarding science: as a body of objective and verifiable knowledge of the physical universe; as a powerful method of investigation of wide application; and as a means by which man controls and uses his environment. There is never any doubt where Mr Crowther puts his emphasis. He has constantly in his mind the interaction between the industrial needs of a given period and its scientific interests. For instance he writes in his *Introduction*:

> "The change in the perspective of scientific attention between 1687 and 1769, from astronomy to physics and chemistry, from the science of mercantile society to that of industrial society entailed an immense internal re-organisation of scientific activity . . . it was a gigantic intellectual re-tooling operation, redirecting, setting-up and sharpening the instruments of the intellect for a long and glorious run on a new product."

This treatment when not pushed to extremes is a useful corrective to the romantic view of regarding men of science as disinterested searchers after truth, impelled by a divine curiosity and sustained by intellectual satisfaction. On this romantic view the discoverer is not interested in what becomes of his findings in a practical way; it is enough that they contribute to the intellectual edifice. Of course, men of science vary much in outlook and motive; times change, and scientists with them, often taking their view about science from the spirit of the age. What is certain is that Mr Crowther's assumptions often lead him into error as when he says that the need for understanding Watt's engine made imperative the development of the concept of energy and this "led to the creation of thermodynamics, the fundamental science of industrialism". Error continues when he asserts that the development of thermodynamics led to the formulation of the quantum theory. It might perhaps be held that he states his creed on p. 102.

> "In a sense, Watt's master invention was primarily an economic invention; the mechanical device by which it was achieved was secondary to the main aim. It is a striking illustration of the primacy of economic and therefore of social factors in invention; economics takes precedence over mechanics. New inventions do not arise merely by one machine leading to another, in a logical but pointless order. The needs of man and society set the aim, and within this perspective, and the circumstances of the time, the inventor produces what is required."

The main figures in this book are Joseph Black, James Watt, Joseph

Priestley and Henry Cavendish. But in addition to these giants there are many other scientists and philosophers whose work and outlook are described. There is much personal detail and the author is sympathetic and generous in his judgments. He is as fair to the aristrocratic Cavendish as to the plebeian Priestley. The wealth of incidental information presented to the reader is astonishing and, more important, he can gain sound impressions of, for example, the brilliant coterie of eighteenth century Edinburgh, the Lunar Society and the Warrington Academy.

At times Mr Crowther moves from one person to another with too great a speed and the thread is lost. There is also, in places, too much repetition; we are told four times that Robison was appointed to succeed Black as lecturer in chemistry at Glasgow. He greatly overestimates the scientific importance of Watt's work and Priestley's contributions to electricity. He has missed the significance of the early aims of the Royal Institution and does not even mention Court Rumford. Nevertheless this book can be recommended in spite of its author's viewpoint and its sundry blemishes. It is the work of a practised writer who knows how to sustain interest in men and movements, in individual experiments and broad theory. It should be of particular value to those who already have a working knowledge of classical science and who wish to enlarge their acquaintance with the individual stories of many eighteenth and nineteenth century scientists and the social history of the same period.

Science Past and Present is a re-issue of a well known book by the late Dr F. Sherwood Taylor, who for some years until his death was Director of the Science Museum in South Kensington.

This work covers an immense range of topics and is profusely illustrated by plates and drawings. The arrangement is chronological, starting with the beginnings of civilisation and finishing with wave mechanics in the present century. Mathematics, physics, chemistry and biology all have a place and attention is given to arts and industries as well as the power and limitations of science. It might be thought that such a wide scope leads to superficiality but this is not so. Dr Taylor made use of a good deal of original material in writing the book, all of it interesting and some very entertaining. His skill in his choice of material and the plates and drawings is evident throughout. He was concerned to show his readers how science has grown and is growing and for this purpose only an historical treatment would serve.

The book in its new form should have a wide appeal to sixth formers and university students as well as to the layman interested in science. The text is well balanced and judicious, and careful examination of the illustrations alone would amplify to great advantage many a student's study of his formal text-books. The reviewer has noted few blemishes though Davy's Christian name is twice wrongly spelt—a common error from which even the Minute books of the Royal Institution are not entirely free.

Dr Beck's book *The Simplicity of Science* attempts to explain how science works and what it is. He describes experiment and theory and deals with the nature of scientific progress. He is concerned with the structure of science and not its history. The key to his title and method is to be found in Chapter 7. The first six chapters lead up to his definition that *Science is a body of tested objective knowledge, obtained and unified in principle by inductive methods.* Subsequent chapters deal with the limitations of science and the relation of science to some other fields of thought.

Dr Beck is a zoologist by training and profession. He has read widely in the field usually called the philosophy of science and as an active Lutheran has attempted to face squarely the relations between religion and science. His book, now issued as a Pelican, is easy to read because the author's own ideas are clear and well expressed; it has an engaging humility.

These three books, all very different in style and content, can be recommended for school and training college libraries, though the reader of the first of them will gain most from it if he is aware from the start that Mr Crowther's views of the nature of science are if not highly individual at any rate unorthodox.

W. J. Sparrow

W. R. Niblett (ed.), *The Expanding University* (Faber & Faber, London, 1962, pp. 132, 18s.).

This book is a study of problems of university expansion in England and consists of papers read to a conference of the University Teachers' Group at Oxford in 1961. Professor Niblett, the editor of the book, has at various points provided a summary of the discussion which these various papers prompted. Of the conference, he says that "most but not all those present were Christians" and some parts of his summaries deal with the special problems which Christians see in modern university development. For the most part, however, the book is concerned with more material and practical problems: its papers are by unquestioned authorities in their fields, and it is to be commended as one of the most thoughtful and responsible analyses to have appeared on the general problem of university expansion.

Sir Charles Morris, writing on *The Function of Universities Today*, analyses the British university tradition, and in the light of it makes some useful and true comparisons with the size of university populations in countries abroad. Owing to our tradition, much that in foreign countries is done in universities would here be done by other institutions of higher education. But when all allowance is made for this, and for the British insistence on the high standards of the first degree, Sir Charles concluded that the case for considerable expansion in the university population of this country is unanswerable.

Lord James, speaking more specifically on the theme of expansion, comes to the same conclusion: the rise in the birth rate in the vocational demand for education, and in the general demand as shown by the increasing size of sixth forms, all suggest that an expansion could be achieved without a fall in standards. He finds that university opinion rather than Treasury reluctance has been the main factor inhibiting expansion: possibly this year he would have changed his view. But he makes a valuable distinction between two problems which are often confused—the desirable size of the total university population of this country, and the optimum size of a particular university. Only recently has expansion been contemplated by means of creating new universities.

Mr Fulton, as might be expected, devotes most of his time to the new curricula proposed at the University of Sussex, and has much that is interesting to say. He offers the figure of 3,000 students as the desirable size of a university, if it is to make a reasonably economic deployment of its academic staff, and offer a reasonable choice of course. Dr Christopherson supports this thesis in general but adds some valuable and thoughtful comments on the kind of administrative structure appropriate to new universities. He also comments, I think rightly, that a good tutorial relationship must be founded upon joint academic work between tutor and student: the notion of "moral tutoring" unrelated to academic work, he rejects as unworkable.

It is difficult to believe that Mr Ogilvie took the title of his lecture *The Role of the Teacher*, seriously. At any rate he offers us little that is new or helpful on this important subject, and instead, devotes the last part of his paper to an attack on the departmental and faculty organisation of university teaching, characteristic of modern universities, and, in part, of Cambridge. It appears to be Mr Ogilvie's thesis that such a structure makes any sound tutorial supervision of students impossible. It is a matter of fairly wide experience that this is not so, nor is there any reason why it should be so: certainly Mr Ogilvie does not argue his thesis and show any logical connexion between this administrative arrangement and the degree of personal attention which students are likely to receive. His is an unfortunate paper which does very much less than justice to the long lines of distinguished alumni of Oxford and Cambridge who have laboured hard, and, I believe, with success to build in the modern universities something genuinely worthy of the traditions of university education they themselves enjoyed.

Professor Niblett in following with a chapter on the *Needs of the Student*, is somewhat handicapped by having to weave some relationship between his subject and Mr Ogilvie's paper. Despite this he manages to say much that is useful. On the specific Christian plea that all students should be confronted with the metaphysical problems to which Christianity provides one of the answers, it should perhaps be stated that there are quite sound pedagogic and philosophical grounds for disagreeing with this. If we leave aside for the moment those philosophers who would argue that all metaphysics was nonsense, most teachers of philosophy would agree that metaphysics is its most abstract and difficult branch, which, if taught to students prematurely, is more likely to result in their uncritical and ill-digested acceptance of other people's views, than to provide a training in critical thought, or to encourage students to think out their problems for themselves. The liberal, in the strict sense of the term, would I think, differ from the ardent Christian in this: he would prefer his students to be trained in critical awareness, even if they had no "philosophy of life", in the hope that, some twenty years later they would arrive at one by their own independent thought, whereas the Christian feels that the problems presented by his philosophy are so urgent that they should be faced and to some extent answered during the period of university education.

W. H. Burston

F. R. Cowell, *The Revolutions of Ancient Rome* (The Great Revolutions Series, Thames and Hudson, pp. 228, 21s.).

F. R. Cowell, *Cicero and the Roman Republic* (A Pelican Book, pp. 398, 8s. 6d.).

Sidney Morris (compiler), *Carmina Latina* (Centaur Books, pp. 80, 5s.).

The Renaissance and the Reformation raised questions and set problems for Europeans which they have ever since unsuccessfully tried to answer and to solve; and they have been unsuccessful largely because they have tended to adopt the impatient way of revolution to find a solution. It is the thinking man's duty to learn the moral of this lamentable history. The publishers are, therefore, to be congratulated on launching their Great Revolutions series, in which Mr Cowell's book is to be found. The series is planned "to give a picture of the world's history by analysing the great upheavals in the cause of freedom which have changed the face of mankind". It may be questioned, however, whether all these upheavals were in the cause of freedom. Certainly the Romans, after several centuries of revolution, found for themselves no freedom.

Mr Cowell tells the story of these centuries, in a book aimed not primarily at scholars, clearly, concisely and shrewdly; and it is all the easier for him to be clear, especially about the often dull and tangled story of politics in the early Republic, because he is enabled to concentrate on one aspect of it.

Although the Romans regarded revolution as something strange and unprecedented, *res novae*, they had nevertheless a tradition of political revolution. The seeds were there in the state, and early struggles between the orders, early troubles over land distribution and debt, helped to fertilise the soil in which they were to grow. The earlier Roman revolutions, although they shaped the constitution, were almost accidental. The Roman character, with its integrity, feeling for social solidarity and respect for law, made them almost bloodless. Even when the pressure of passion made bloodshed necessary, the Romans had always the outlet of a minor war with their neighbours. And the constitution, when shaped, was so admirably balanced by counterpoises that it was able to prolong prosperity and to delay the final upheaval.

Then came the turning point. As Polybius says: "When a commonwealth, after warding off many great dangers, has arrived at a high pitch of prosperity and undisputed power, it is evident that, by the lengthened continuance of great wealth within it, the manner of life of its citizens will become more extravagant; and that the rivalry for office, and in other spheres of activity, will become fiercer than it ought to be. And as this state of things goes on more and more, the desire of office and the shame of losing reputation, as well as the ostentation and extravagance of living, will prove the beginning of a deterioration. And of this change the people will be credited with being the authors, when they become convinced that they are being cheated by some from avarice, and are puffed up with flattery by others from love of office. For when that comes about, in their passionate resentment and acting under the dictates of anger, they will refuse to obey any longer, or to be content with having equal powers with their leaders, but will demand to have all or far the greatest themselves. And when that comes to pass the constitution will receive a new name, which sounds better than any other in the world, liberty or democracy; but, in fact, it will become that worst of governments, mob-rule." The later Roman revolutions, though relying on mob-rule, were centred round persons, and upset the system of balance. Caesar's was the last and only really effective political revolution, since it successfully changed the position of political power. What he produced, and Augustus disguised, was not freedom, but military tyranny so powerful that it lasted for centuries until the final revolution of all, when the City turned to Christianity, and Romans "Rebelled not against political authority, but against the very way of life which that authority sustained."

Such is the story which Mr Cowell tells, with a wealth of quotation from ancient sources, of which the remarks of Polybius, above, are a sample. It is of course not a new story; the author would lay no claim to novelty. But he has certainly put some good, salt flesh upon what many a sixth former has regarded as dry, old bones. The only adverse criticism one might make is that in his brief reassessment of Augustus, in the light of the events of 1933, he is possibly a little unfair; and that in his efforts to make the story complete for the uninitiated, he has brought into the first three chapters some matter which is superfluous. The early social and political background, though it defines the grounds of future conflict, could have taken up much less space; and the expulsion of the Tarquins is surely not so much a political revolution as a revolt against foreign dominion.

This tendency to stray from the bounds of his subject is more apparent in Mr Cowell's earlier book, *Cicero and the Roman Republic*, first published in 1948 and now available in Penguin Books. Sixth formers, more or less new to Roman History, and eager to acquire a good deal of knowledge in a fairly small compass, will find this a very useful book, for it contains much detail and many interesting statistics, which are the fruit of sound scholarship, here well and clearly set out. It must be said, however, that the title is a deceptive one. No amount of apology could really justify dragging into the first three chapters the early history of Rome, and the greater part of the book, though written with Cicero in mind, is really nothing more than an interesting account of social life in Rome. The actual story of Cicero and his dealings with the Republic, which occupies the last third of the book, is told clearly enough for the uninitiated, and made interesting to those familiar with it by being written from Cicero's point of view and with frequent and apt reference to his letters.

In the Pelican Series, the book, as so often happens in books on Rome, is marred by the flat-looking illustrations, which seem to have been reproduced from old photographs with too little depth of focus. What a pity it is that publishers so rarely take advantage of advances made in photography in order to give us more stimulating illustrations.

Mr Morris's collection of Latin songs caters well for the recreational side of Latin that is so often neglected. The six parts of his book are devoted to Nursery Rhymes, Rounds, Popular Songs, Carols, Hymns and Student's Songs, and range from the great hymns of the medieval church to witty modern versions. The tunes are provided, but unfortunately they are littered with mistakes in notation, and it is sometimes difficult to see how the words fit the music.

C. W. E. PECKETT

F. J. SCHONELL AND J. McLEOD, *The Wirral Mechanical Arithmetic Tests (and manual)* (Oliver and Boyd).

THESE four pairs of twenty minute tests are graded to test attainment in mechanical arithmetic in each of the four years of the primary school; each test involves use of the four rules and of measures with units suited to the age group. The A and B forms of the tests are not parallel but complementary, but it is possible to use either to obtain a child's A.Q. or his percentile rank. It is recommended that both forms of the test should be used within a fortnight for a more reliable assessment of the child's attainment; for maximum validity the tests should be given in the second or third term of the school year. As usual, retardation or advancement may be measured by using tests for younger or older children, but in the case of a good arithmetician it is suggested that comparison of his score in the test for his own age group with that for the older group may show the accessibility, or otherwise, of more advanced material.

The manual is of interest in that, in addition to the usual instruction for administering the tests, there is a brief description of the methods of standardising them. An appendix is also provided in which terms are defined and methods of standardising are further explained for readers with some statistical knowledge. This should be of value to students as well as to teachers and research workers who need carefully prepared tests of arithmetical attainment.

R. BEARD

C. PLUMPTON AND W. A. TOMKYS, *Sixth Form Pure Mathematics*, Vol. 1 (Pergamon Press, 21s.).

THIS is the first volume of a series for sixth forms in which the authors, a university lecturer and a grammar school master, cover most of the Pure Mathematics required for the single subject Mathematics at Advanced level. The treatment of the subject matter is concentric, each new chapter builds on preceding work, the new techniques being used in subjects already discussed. The first chapter, on elementary calculus, is followed by chapters on co-ordinate geometry, methods of calculus, circular functions, the quadratic function, numerical trigonometry, finites series, infinite series, partial fractions with applications, and further methods of integration.

Although much is covered in little more than 400 pages it is achieved so concisely and clearly that there is still space for a wide variety of applications and methods. Applications are drawn from physics, astronomy, geography, gunnery and mechanics; and topics not always considered or well done at this level, include the form $S+kS'$ for curves through the intersections of given curves, vectors, and thorough expositions of curve sketching and of partial fractions. There are numerous examples which provide elementary practice of new processes as well as assorted problems graded in difficulty; many of these examples are drawn from Advanced level and Scholarship papers of the four Examination Boards.

Some teachers may consider that their less able pupils would find this too hard as a first book. It assumes a good standard of attainment and, although the authors say that knowledge to G.C.E. O level is sufficient in the reader, it seems likely that a sixth former who had not taken the Alternative syllabus at O level would find the introduction to calculus and co-ordinate geometry somewhat hurried. But for the able pupil with a suitable background this should be a very useful book; it is extremely clear, well set out and provides ample practice to lead him to a very high level of performance.

R. BEARD

Education in South Africa. Education and Our Expanding Horizons. Proceedings of the National Conference on Education, University of Natal, 1960 (University of Natal Press, 1962, R.c. 25 in South Africa).

THE most remarkable and encouraging thing about this Conference was that it could take place at all. The Conference President, Dr E. G. Malherbe, Principal and Vice-Chancellor of the University of Natal and "the moving spirit" of this Conference and a similar previous one in 1934, states in his foreword that the delegates, "whether they were from overseas or from South Africa, from His Excellency the Governor-General (who opened the Conference) downwards, spoke their minds freely", and goes on to say that "the world could see that South Africans could tolerate widely differing points of view, some openly critical of Government educational policy, and that it was at any rate not yet the 'police state' which many overseas people believed it to be". The University (of Natal) still survived as a pocket of academic freedom and stability in the country.

The Editors of the Proceedings (a book of some 550 pages), Professor R. G. Macmillan, Dr P. D. Hey and Mr J. W. Macquarrie of the Department of Education, University of Natal, have stated South Africa's main educational problem in their joint introduction. Education of the non-European population has increased considerably, yet there has been "a steady and constant diminution of their participation in the government of the country as a whole". What makes the situation even more critical is that the most highly educated groups of non-Europeans can see across the borders of South Africa "their less sophisticated, less civilised brothers discharging the highest functions of the modern state". In addition to these basic problems, there are the questions of the control of education; should it be on a regional or provincial level, or, as is the present government policy of the government, should it be compartmentalised its various racial and language groups? The Conference was organised against this background, and in consequence the speakers were asked to consider "larger topics" and to concentrate upon "the more interpretative, critical and speculative themes".

The response both from within the country and from overseas was most encouraging, and the organisers can rightly claim that the views of all groups in South Africa were presented, in addition to those of many distinguished visitors from overseas, who included Sir Julian Huxley, Sir Vivian Fuchs, Sir Edmund Hillary and many well-known educationalists from universities in England, the United States, Canada, Holland Germany and other parts of Africa. The programme consisted of common lectures of interest to all the delegates and of work in ten sections, each of which considered one particular topic, as, for instance, the Aims of Education, Education and the State, and the various levels of education from the primary school to the university.

The lectures and papers given in the course of the Conference have been published in the Proceedings in eight chapters, Expanding Horizons (the main theme of the Conference), Philosophy and Education, Education and Society, Education and the School, Education beyond the School, Education and the Teacher, Education and the Arts, and Education and the Sciences. In view of the distinguished list of speakers and the high level of the contributions, one has the feeling of reading eight Year Books of Education in one volume, with the additional interest that these contributions are all of vital importance to educational thought in the host country.

The problems and effects of the Conference are discussed by Professor J. A. Lauwerys of the Institute of Education, London University, in one of the Summaries. What were the delegates to do in view of the principles behind public policy in South Africa? They had a human right to speak out "in a spirit of love, sympathy, respect and admiration for the whole of the South African nation". The delegates from South Africa would be less isolated "for they will feel themselves in fellowship with the people of other countries and know that their views are shared by many others. . . . The world has grown too small for anything but the truth and too dangerous for anything but brotherhood." If the Conference has contributed to the mutual understanding between South Africa and the rest of the world, and there is every sign that it has done this, it will have been an effort tremendously worthwhile, an effort for which the credit must go, without doubt, to Dr Malherbe.

R. H. F. DALTON

A. TAYLOR (ed.), *Educational and Occupational Selection in West Africa* (Oxford University Press, 25s., in U.K.).

IN the spring of 1960 a Conference on Educational and Occupational Selection in West Africa was held at the Institute of Education at the (then) University College of Ghana. The Chairman of the Conference, and the editor of the book featuring the lectures, summaries of discussions and recommendations of the conference, was, very suitably, Mr Andrew Taylor, the then Director of the Institute and now Professor of Education at the University of Nigeria, Ibadan. The generosity of the Carnegie Corporation of New York made it possible for the Conference to be attended by experts in the field of selection from England, the United States and other parts of Africa, most of whom read papers which are reproduced in the present book. On the receiving end, as it were, were representatives from government, the forces, higher education and business, who explained present practice and were material in the drawing up of the recommendations.

The great value of this conference was that it was held on the very spot where the advice was needed, so that the eventual recommendations were realistic and the outcome of deliberations with the people who were most actively concerned with their execution. This realism was enhanced by the personality of "Andy" Taylor, who in his own paper rather modestly describes his contribution to personnel selection in Ghana and, indeed, West Africa. Anyone who has seen him devising and executing the tests, and I am writing here as a former Secretary to his Institute of Education, will realise that this quiet and yet so dynamic man has been making a considerable contribution to the improvement of standards in education, the public services and business in West Africa to-day.

R. H. F. DALTON

MODERN BIBLE TEXT-BOOKS

MARGARET E. ROSE, *Battle for a City : First Isaiah* (S.C.M., London, 7s.6d.).

J. A. WAINWRIGHT AND M. HARDILL, *The Fall of a City : The Book of Jeremiah* (S.C.M., London, 6s. 6d.).

D. S. RUSSELL AND M. R. BIELBY, *Two Refugees : Ezekiel and Second Isaiah* (S.C.M., London, 6s. 6d.).

R. C. WALTON, *A Gospel for Martyrs : Saint Mark's Gospel* (S.C.M., London, 6s. 6d.).

J. TRILLO AND J. SHEPHERD, *The King's Story : Saint Matthew's Gospel* (S.C.M., London, 7s. 6d.).

E. PATEY AND R. C. WALTON, *A Doctor's Life of Jesus : Saint Luke's Gospel* (S.C.M., London, 7s. 6d.).

R. C. WALTON, *Teacher's Handbook* (S.C.M., London, 6s. 6d.).

THIS new series of classroom commentaries is intended for children of 14-16 years "of average ability". One suspects this is longhand for "Sec. Mod." but these are grammar school books. Each contains dramatised scenes depicting the origin of some portion of the text, a commentary of significant passages, and a list of "things to do".

The dramatic scenes may not be outstanding examples of playwriting but younger children, at least, will enjoy reading, and possibly tape-recording, them. Experienced teachers will be aware of the danger that children will take as "Gospel truth" those statements which are included by playwright's licence.

The volumes on the Gospels use the dramatisations to explain the origins of the books and teach "The Synoptic Problem Without Tears". The commentaries are, perhaps, less happy. The writers, whose theological learning much exceeds their classroom experience, have overestimated the devotion and ecclesiastical interest of the general run of school children. Consequently they use concepts and words which are familiar only to the church-going few, and occasionally they come near to sermonising.

The three Old Testament volumes attempt, not without success, to solve the problem of teaching the prophets. Unfortunately the essential doctrine of each prophet is obscured by a plethora of background material, and the dramatic scenes are often rather flowery for the taste of adolescent boys. One wonders whether each prophet needs the length of a whole book, for Ezekiel and Second Isaiah, who share a volume, come out in sharper focus.

The style varies from the racy to the mystical, and the "things to do" range from drawing a picture of Ezekiel's vision to discussing divorce. Since children vary greatly in their religious outlook between 14 and 16, one could have wished that the series had been more closely graded.

Like all text-books, these volumes will be as good as the teacher who uses them. The non-specialist should find them unusually helpful, while the expert will discover much usable information, even though he may think fit to include it in his verbal teaching rather than have it read from the book. Some of the suggested "things to do" ought to brighten up many a scripture lesson in the middle grammar school, and the commentaries might assist in O level preparation.

EDWIN COX

C. W. VALENTINE, *The Experimental Psychology of Beauty* (Methuen, London, pp. xiii + 438).

MANY years ago Professor Valentine wrote a short book on the experimental study of beauty which, as long as twenty years ago, was practically unobtainable. Little else of a general kind in this field has appeared since. In his most recent "swan song" Valentine continues the discussion by coming up to date with references to many researches carried out, particularly in English speaking countries, during the last twenty-five years. Basically it is an annotated bibliography with liberal interpretations and observations from the author. As might be expected from a man of Valentine's years of experience, the style of commentary is anecdotal and the discussion of the experimental results augmented by his own insights and intuitions.

The book achieves what is claimed for it, but, when viewed as a source book for research workers, I think it is a pity that the details about particular researches are not fuller. Also it would have been a real advantage to have had a full alphabetical list of references to papers and books, in addition to the existing indices of names and subjects.

To some extent the title is a misnomer, since in the bulk of the researches described the experimenters rarely use the word *beauty*. It would, in fact, be interesting to know what proportion do so. Most use "liking", "preference", "pleasantness" and so on. Valentine is well enough aware of the pitfalls surrounding the word beauty, and wisely keeps its use and futile discussion of it to a minimum. It is important to know what people like in art, literature and music and to know how their preferences are related to their age and education. The question as to "What is Beauty?", need not be evoked in such a survey.

The book can be recommended for research workers and the more general reader wishing to know more about people's appreciation of the arts.

E. A. PEEL

W. I. SMITH AND J. W. MOORE (eds.), *Programmed Learning* (Van Nostrand, London, 1962, 15s.).

THIS collection of readings (No. 8 of a series of paper-backs on psychology) contains a selection of articles and reports on self-instructional methods of teaching. The basic ideas of programmed learning are that (*a*) the material to be taught should be broken down into a very finely graduated sequence of steps to ensure a large proportion of correct responses, (*b*) these responses should be reinforced or confirmed immediately, (*c*) the learner should proceed at his own pace through the programme.

Within the limits of these criteria a variety of principles and techniques have developed. One point of view is a development of the Harvard psychologist, B. F. Skinner's views on learning, in which a performance to be acquired is "shaped" from the subject's previous repertoire of behaviour by rewarding successive approximations to the desired response, and an appropriate "schedule of reinforcements" will provide resistance to extinction. This view holds the avoidance of incorrect responses to be important and an elaborate structure of cues and prompts is used to ensure that the desired answers are given. These supports are gradually withdrawn, a technique known as "vanishing". In this kind of programme (referred to as *linear*) learners read the whole sequence of items.

An alternative standpoint is taken by Norman Crowder, who asserts that the pupil's errors may be utilised for diagnostic purposes and to give *meaningful* instruction. His *branching* programmes enable the brighter or more knowledgeable pupils to omit items they already know and provide opportunities for others to follow remedial sections of the course (branches) before returning to the main stem.

The articles contained in this book cover a wide range of topics in the area of self-instructional materials—from discussion of educational issues to minute points of teaching machine theory. The editors have included a number of seminal papers in the development of programmed learning. Pressey's (1950) description of his long experience with devices for giving immediate knowledge of results, Skinner's influential "Science of Learning and the Art of Teaching" (1954), which gave impetus to the movement, and several other articles are reproduced from more expensive source books. Skinner's views are well represented and advice on how to construct programmes may be found in several of the chapters as well as in that devoted to the topic. Unfortunately, fewer than a score of examples of programme frames are given.

Some of the later chapters are somewhat trivial in content. There is a report, for example, of an attempt to find whether omitting to give answers resulted in poorer learning than when the answers were included, using a small step, low error-rate, linear programme which included the correct responses as prompts in later frames. The editors have also failed to edit the references at the end of the papers, and readers are warned that some of these references are to be found in Galanter's and in Lumsdaine and Glaser's book—or even in the present book!

In spite of these strictures the book is recommended as an introduction to programmed learning. Additional value is given by a glossary of teaching machine terms, and lists of journals printing articles on this topic and of addresses of teaching machine and programme corporations.

G. O. M. LEITH

C. A. MACE, *The Psychology of Study* (Penguin Books, 1962, pp. 115, 3s. 6d.).

IN essentials this is a reprint of the Psychology of Study which Mace published in 1932. It has chapters on Human Nature, Perception, Memory, Thought and Concentration. It is little more than a slight essay, inspired by the work of McDougall (1908), William James (1890), and older philosophical writers.

It seems almost incredible that such a book should now be reprinted as a Psychology of Study. Psychology is supposed to be an empirical science. Yet Mace, although posing as an authority, has made no mention of the vast amount of empirical work in educational psychology which is relevant to his subject. It may be uncharitable to criticise a book for what it is not, but it seems an imposition on the public at large to republish vague generalities, couched in an obsolete terminology, when there has been much direct investigation of many of the subjects which are dealt with. The chapter on thinking, for example, derives from Locke and the British Associationists, and makes no mention of the work of Duncker, Bruner and others, whose work is certainly of interest here.

Detailed criticisms are hardly worth making, but this reviewer found the ponderous and childlike humour, and the figurative style of writing extremely irritating, and cannot believe that the book will be of assistance to any but students of philosophy at the ancient seminaries of learning.

H. MADDOX

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EDITORS
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H. J. HALLWORTH
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CULTURE AND ANARCHY*

by A. D. C. PETERSON

Director, Oxford University Institute of Education

WE are approaching the centenary of the publication of one of the most long-lived essays ever written in the rather disreputable field, in which I practise myself, of educational journalism. I think it is worth inquiring why it has been so long-lived. It is not merely because Arnold's tastes and even sometimes his expression strike us as so contemporary—though I think that this brief quotation might convince any who have not read the essay recently that this is true. Arnold is complaining that the ostensibly Christian middle class, which should be a positive force for the dissemination of sweetness and light, has failed so lamentably to meet this obligation and is developing instead into the "affluent society":

> We are all of us, he writes, included in some religious organisation or other; we all call ourselves, in the sublime and aspiring language of religion which I have before noticed, "children of God". "Children of God"—it is an immense pretension—and how are we to justify it? By the works which we do, and the words which we speak. And the work which we collective children of God do, our grand centre of life, our *city* which we have builded for us to dwell in, is London! London with its unutterable external hideousness and with its internal canker of *publicè egestas, privatim opulentia* (that is in Galbraith's terms public squalor and private affluence) unequalled in the world. The word, again, which we children of God speak, the voice which most hits our collective thought, the newspaper with the largest circulation in England, nay with the largest circulation in the whole world, is the *Daily Telegraph*.

Written nearly a hundred years ago these words, with their implications of behaviourist evaluation, their sociological insight and the vigour of their expression would not seem very much out of place in the New Left Review.

But it is not the modernity of Arnold's thought in *Culture and Anarchy* that I want to draw attention to, it is the comparative timelessness. I believe that though all societies are always threatened by anarchy, English society, as Arnold saw, is peculiarly at the mercy of this force and nowhere more so than in the field of education: and this, of course, is because there is so much virtue in anarchy and particularly that virtue, freedom, which we most admire. If in the world of education we have one lesson which we most need to learn from the culture of our neighbours in Europe and even in Scotland, it is that anarchy and freedom are not the same thing.

---

* The Inaugural Lecture of the Birmingham University Education Society.

What I would suggest for some consideration to-night is that our whole educational system, both in its organisation and in its system of values is still suffering from a particular disease which Arnold diagnosed a hundred years ago and that this disease is a peculiar form of the *trahison des clercs*. It is not with us, as Benda saw in France, an abdication of the intellectual since the intellectual never held the power to abdicate. It is that those who are in the position to act for what Arnold would have called the dissemination of sweetness and light, have not the nerve to assert themselves, or are so obsessed with the value of leaving everyone to "do as he likes" (which Arnold saw as the besetting sin of the English), that they leave them a prey to the forces of anarchy. And the result of anarchy in education is, as it has often been in political history, stagnation.

There is an anecdote in *Culture and Anarchy* which Arnold clearly means as a fable and is, as much as any of James Thurber's, a fable for our time. An Alderman-Colonel was leading a body of the militia through the London streets, and from now on I quote Arnold's words:

> The bystanders gathered to see him pass: the London roughs (we should perhaps say Teds) asserting an Englishman's best and most blissful right of doing what he likes, robbed and beat the bystanders. The blameless warrior magistrate refused to let his troops interfere. "The crowd", he touchingly said afterwards, "was mostly composed of fine healthy strong men, bent on mischief." If he had allowed his soldiers to interfere they might have been overpowered, their rifles taken from them and used against him by the mob.

This distrust of ourselves as an adequate centre of authority, which Arnold saw in the middle class of his day, is I believe one of the gravest weaknesses in our educational system. We may have critical standards of taste or conduct but we are afraid to assert them, lest they should be wrenched from our hands and turned against us by the mob.

Let me give you some concrete examples, drawn from the field I know best, the Grammar School. In every European country but England and Wales the cultural leaders of the nation, through their natural administrative instrument, the Ministry of Education, have decided what range of studies is suitable at different ages for the ablest youth of the coming generation. A variety of choices is always offered in what the French call the second cycle, but the broad pattern is laid down—thus no-one may entirely abandon the study of their own language and literature, of mathematics, or of at least one foreign language before the age of eighteen. This is insisted upon because it is regarded as being part of *culture générale* or *algemeine bildung*.

Our cultural leaders and our Ministry of Education have been so determined not to interfere with the right of every headmaster to teach what he likes, and of every college at Oxford or Cambridge to prevent him from doing so by setting what examinations it likes, and of every one of ten separate examining boards to prescribe what syllabus it likes, and of every department at every university to demand whatever subjects at whatever level it likes, that the whole question of what ablest youth are to learn has been left to the supposedly life-giving forces of anarchy, like the town planning of greater London. And what is the result of this nervous, scrupulous refusal to interfere or to give any direction? Does it mean that the English sixth form boy is more free than his European counterpart to choose the field or the range of his study? Not if we base our evidence on actual behaviour: The majority of them are taking a very stereotyped course of maths, physics and chemistry for four-fifths of their working week; there is no wide divergence from one school to another in the nature of the courses; and less than 3% are taking any unusual combination of main subjects drawn from the arts and science sides—though 40% would like to. It is then that our schools and our science masters have a wider freedom to teach the individual subjects in the way that they think best? On the contrary: a typical physics syllabus for the German Abitur is seven or eight lines long and refers merely to essential principles: that for an English A level more than twenty times longer, and lays down in detail every individual process and experiment to be included in the course. To such a state of stagnant conformism has the refusal of our cultural leaders to interfere with the God-given right of examining bodies to do as they like led us. Anarchy in the curriculum has no more produced freedom for the individual pupil than anarchy among the feudal barons produced freedom for the villein. But Anarchy has not only produced its usual child, Conformism: it makes change almost impossible. Let us suppose, as is indeed the fact, that the great majority of our cultural leaders in a particular field (and by this I mean the Modern Language Association) wish to reform the examination and, therefore, the teaching method, by ceasing to demand prose composition at Ordinary Level. What, under the conditions of anarchy, do they have to do? First they must persuade the syllabus panel of *one* examining board to make the change. This is hard because such panels tend to consist of well established and conservative men. But suppose they do it. That is only one board, and only a few schools will benefit. The effort of persuading ten separate syllabus panels to move simultaneously in the same direction takes years. Even then there will be die-hards who fight to the last ditch and so in all probability a compromise will be made and the improved system will be brought in not as a substitute for the old but as an alternative—as statistical method has been in the mathematics A level syllabus. And so the God-given right of every teacher to go on doing as he likes will be preserved and many of them will like to go on in the way their fathers went because it is less trouble than to change, though their pupils are seeking an education for a totally different sort of world. And this is called freedom—though the freedom of the pupil, the person who is after all the object of the entire exercise, is never considered. And all this happens because those in whose power it lies to act do not really believe in culture, do not believe in their own judgment, but prefer to let everyone go on doing as he likes in a state of anarchy.

But perhaps you may say, as Arnold's contemporaries did, that they are right to do so: that there is nothing worse than an imposed culture and that freedom of everyone to do as he likes is the essential safeguard both of liberty and progress—that culture in effect must grow from the spontaneous reaction of each class and generation to its environment and cannot be imposed either by elders or leaders. It is on this fundamental issue that I believe we might look again at Arnold's thinking. His argument that anarchy, simply leaving everyone to do as he likes, produces not freedom and certainly not culture but at best stagnation and at worst the tyranny of bad taste over good and the roughs over the citizens seems to me irrefutable. It is also important—unless, of course, your society is so far gone in self distrust as not to believe that there *is* any difference between good and bad taste, or between hooligans and citizens—or for that matter between compassion and callousness. In spite of the at least half-merited Russian criticisms of our lack of public standards, I don't think that we have gone quite as far as that.

When we come to the positive argument for a cultural lead however, Arnold's position seems less sympathetic to the present day.

All the old arguments, which Arnold met, against any genuinely national system of education—and a system which does not concern itself at all with what is taught can hardly be called one—are still produced to-day. "The whole system of this country", he quotes *The Times* as saying, "like the constitution we boast to inherit, and are glad to uphold, is made up of established facts, prescriptive authorities, existing usages, powers that be, persons in possession and communities or classes that have won dominion for themselves and will hold it against all comers." As a picture of the educational scene, even if we have moved a little further towards an open society in other spheres, it is just as true as when it was written, with such complacency, nearly a hundred years ago. And I am irresistably reminded of Jo Grimond's criticism of the present state of our general administration on his return from America: "The British are obsessed with the difficulties of doing the simplest things. Britain has a difficulty for every solution. We are swathed in precedents, enquiries, ancient forms and complications of every sort."

To break up the stagnation imposed by this nexus of "powers that be", Arnold wished to arm with authority and the will to act something which he described as "right reason and the will of God" or "our best selves" and he believed that the objective of this force should be the growth of sweetness and light—humanity, tolerance, even Christian charity, allied with intelligence and the rigorous pursuit of truth.

It would be difficult to quarrel with such an objective, and I believe that we should retort to those who do so in the name of spontaneity or much more dangerously of "dark gods" or "the truth of the blood" or such romantic concepts, in a somewhat Platonic manner, saying that they may be great artists truly portraying a suppressed element in human nature: that it may indeed be right that this element should be recognised and some valid expression given to its force: but that in the end it is rightly suppressed or controlled or transformed because civilisation demands that this should be so, and because the values in whose interests this happens are higher values. That to smash and to desecrate may be spontaneous reaction to our flawed civilisation, that it may even be an intelligible reaction but that it is not a good nor an intelligent one. It seems to me that the mistake which our society has made about the literature of the romantic agony is simply the mistake of Marianne Dashwood, the confusion between the aesthetic expression of certain human feelings and their establishment as models of conduct.

Why then does Arnold's idea of culture seem so out of date? We know that all societies do, in fact, impose a culture—whether they are teen-agers, Red Indians, public schoolboys or West Side gangs. Why do we shrink from Arnold's conception of a society which has become sufficiently self-conscious to control deliberately, and in the interests of sweetness and light, the culture which it imposes? One reason at least, I believe, is that because he drew so much of his inspiration from France and from the classical heritage he sometimes thought of the place of education in the transmission of culture as being much too simple the conveying of a body of writings—the best that has been thought and said. This was presumably what T. S. Eliot had in mind when he talked about the "thinness" of Arnold's idea of culture and the fact that, for instance, it did not appear to include the plastic arts. This may be unfair to Arnold: there is at least one passage in the essay, and many outside it, where he made it clear, for instance, that in the classics versus science controversy of his own day he stood clearly with Huxley and Mill in support of both—and, therefore, of the unity of knowledge; and therefore against the bigots and specialists who saw virtue only in one aspect of culture: "Culture", he says, "is a harmonious expansion of all the powers which make the beauty and worth of human nature, and is not consistent with the over-development of any one power at the expense of the rest." But if Arnold saw this truth in his better moments there were times when educationally he seemed to be thinking in terms of a *culture générale* which, as the history of French education has shown, can so easily be corrupted into a wide and superficial knowledge.

If we have the courage of our convictions, however, and regard culture as something worth passing on to our children and something of which they must not be deprived by any undue deference to the divine rights of anarchy, then it is in terms of "the expansion of powers" that we must think, and not in terms of the acquisition of knowledge or even of critical taste. And I wonder whether most of the arguments brought against an "imposed culture" do not lose all their validity as soon as one begins to talk in terms of powers rather than of knowledge or canons of taste.

I have argued elsewhere that we can roughly classify five separate intellectual powers which must be developed in formal education if individuals are to realise their "best selves" and if the society is to develop a high culture. These are the power of logical analysis, the power of moral awareness and judgment, the power of

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aesthetic appreciation, the power of scientific reasoning and the power of human sympathy. The various studies of our school and university curricula are fitted in differing degrees to develop these powers: mathematics and syntax for the development of logical analysis, for instance, literature and history for moral awareness, etc. And I will ask you to consider very seriously what is the purpose of these academic studies if it is not the development of such powers.

Yet instead of designing our curricula to help adolescents to develop that harmony of which Arnold speaks, we have allowed anarchy the sacred right of everybody except the student to do as he likes, a completely free hand. The result is that some powers are far too early and excessively developed, while others are neglected.

I have not time to cover the whole lamentable field of our omissions. Let me take as my concluding and most factual examples that section of our youth whose cultural deprivations could have the most serious consequences—the grammar school sixth former. In boys' schools rather more than two-thirds of these are on the science side: in some schools as many as four-fifths: the difference is one of the school organisations not of the choice of the pupil. What is their education doing towards the awakening of the moral awareness and judgment? What for the power of aesthetic appreciation? What for the development of human sympathy? We do not yet know nearly as much as we should like about the part that education can play in the development of moral awareness and judgment, but Baroness Wootton is surely right in saying that perhaps the greatest problem is to find the way of administering the "moral shock"? And Bergson and Whitehead were also right, I believe, in emphasising the importance of the "vision of greatness" or the "call of the hero". Where is this shock or call to come from? For some, perhaps, but on purely practical grounds it can only be for a few, from the kind of "samaritan service" that Kurt Hahn advocates. But surely the whole tradition of our civilisation cries out that for most young people this is an imaginative experience and that the medium of transmission is and has been since Homeric times imaginative literature. This is what Arnold meant when he said that poetry (by which he meant imaginative literature) would take the place of religion. I don't know that I would go the whole way with Dr Leavis in the methods which he advocates for making English Literature the centre of moral education. But I have long been certain that without the serious study of literature and history moral and political education is impossible. Very well then, what has the beloved anarchy given us? Our sixth formers, alone of their contemporaries in the western world, need have no contact either with history or with the literature of their own or any other country. The survey published by the A.M.A. in 1962 showed that less than half of the science sixths did any English at all: and of those who do "English" probably only a small minority are reading imaginative literature while the rest prepare by an assiduous attention to linguistic exercises to get enough marks to pass a "use of English" paper. The development of their aesthetic appreciation is equally neglected. Of the freshmen (men and women) entering Oxford this year who had served their three years in the science side at school, not much more than one-fifth had had any opportunity to follow or practise music, painting, drama or craft as part of their formal education.

Do we believe that this is a balanced education? Do we believe that it leads to "the harmonious expansion of all the powers which make the beauty and work of human nature"? If we do believe it, how do we justify such a belief? If we do not believe it, do we genuinely think that the harmonious expansion of all the powers which make the beauty and worth of human nature is not a legitimate educational aim? Or, accepting it as a legitimate educational aim, do we lack sufficient confidence in ourselves to impose it on our system?

These are the questions which Matthew Arnold put in *Culture and Anarchy*. He has waited nearly a hundred years for an answer and it seems to me that the matter is getting rather urgent.

EDUCATION AND SOCIETY

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PART I

We have recently become very conscious of what are termed the "social responsibilities" of the educational system; and the view that the school should respond automatically to vacillating social pressures is commonly taken for granted. Behind such formulations of the role of the school, lie particularised notions which are intended to affect not only the general ethos in terms of which schooling is carried on, but also to influence specific aspects of the educative process—aspects such as the teacher's view of his own function, the methods to be used, and so on. In view of the practical influence of these doctrines, it seems a matter of some moment that they should be subjected to detailed examination; and I propose to subject some of them to such an examination in this article. I shall, however, draw my examples from the great social theorists of education—men of the calibre of Mannheim, Durkheim and Dewey—rather than from ephemeral statements of social obligation and influence such as appear in the daily press or the educational weeklies.

(*a*)

First, what are some of the more general principles involved? The central argument, briefly, is that (*a*) our society is changing rapidly, and (*b*) changes in the curriculum (and elsewhere in the system) must keep pace with these social changes. Dewey expresses the situation admirably:

> . . . our social life has undergone a radical change. If our education is to have any meaning for life, it must pass through an equally complete transformation.

Behind such demands there are several assumptions. One is that there is a necessary connexion between social ethos and educational system, so that, it is argued, as in the past changes in the one have been reflected in the other, the changes which have been brought about recently in the structure of our society demand that there should be a corresponding change in education; as Durkheim puts it:

> . . . our pedagogic ideal is explained by our social structure. . . . The man whom education *should* realise in us is not the man such as nature has made him, but as the society wishes him to be; and it wishes him such as its internal economy calls for. . . . Every change of any importance in the organisation of a society results in a change of the same importance in the idea man makes of himself. . . . Thus, in the present as in the past, our pedagogical ideal is in every detail the work of society. It is society that draws for us the portrait of the kind of man we *should* be, and in this portrait all the peculiarities of its organisation come to be reflected. (*Education and Society*, pp. 122-123 (my italics).)

I will examine this argument a little more fully.

We note, in Durkheim's exposition, the jump from a factual situation to an evaluation. The sociological facts are stated: all societies show this correlation between structure and education—when one changes the other does; and the conclusion is then drawn (the implication is in the italicised "should") that therefore ours ought. But if all societies do, in fact, show this degree of correlation, how does it come about that we need to be persuaded to make it? It appears that it must happen automatically anyway. The suggestion that there may be, at the moment, an imbalance indicates that there is at least one society (ours) which does not bring about this close correlation. This is confirmed later when we are informed that our "moral unity is not at all points what it should be. We are divided by divergent and even sometimes contradictory conceptions." Or again, that

> Everyone recognises that (secondary education) cannot remain what it was in the past; but we do not see with the same clarity what it is to become. . . . To-day we lack any expression to characterise the objective that education in our *lycées* should pursue; this is because we see only rather confusedly what this objective should be. (p. 141)

Obviously, then, a change in social structure does not automatically induce educational change; and, because of this, there would seem to be some opportunity for human choice in what educational changes are to take place. This Durkheim himself comes to admit when he goes on to exclaim, in his essay on "Evolution and Role in Secondary Education", that such changes cannot be adequately brought about by administrative decree:

> One does not decree the ideal; it must be understood, liked, desired by all those who have the duty of realising it. (p. 142)

But there is, of course, the further point that, even if education, as a matter of fact, does often reflect the nature of the social system, it does not necessarily follow that it *ought* to do so; to assume so is once more to derive a judgment of value from a statement of fact (1). There is actually no necessary correlation between change in social structure and change in social doctrine. As Mr Hedley Bull points out in a recent number of *Inquiry:*

> Social doctrines are contradicted only by other social doctrines and not by circumstances . . . changes of circumstances do not invalidate moral principles; but they destroy the coherence of sets of moral principles by replacing situations in which it is possible to act consistently with all of them with situations in which it is necessary to choose between them.

(He instances, as an example, how the increasing humanisation of social life, manifested in the moral desire to relieve suffering, may interfere with the moral imperative to avoid birth control.)

There are, moreover, further considerations of a more general nature. Because, as a matter of fact, certain changes take place in the social structure, the educator is not morally obliged to follow them unless he is persuaded, on grounds other than the *fact* of change, that these changes are for the good. The ethical proposition that all change is necessarily change in the direction of the good, commits the naturalistic fallacy (2). Therefore, the fact that social changes take place lays no obligation on the part of the educator to reflect these changes in his curriculum. Change does not necessarily imply progress; and some changes may be for the worse.

Hence it is important to regard with suspicion Mannheim's assertion that "norms are themselves not absolute but change with the changing social order" (3). As a statement of likely eventuality it commands a certain assent. This does, in reality, *tend* often to happen; but not invariably nor for everyone. The extent to which norms *ought* to change with the social order is a matter for particular judgments in particular cases, where the grounds on which the adaptation is made go beyond the simple assertion that the change has taken place in the social order. Hence the fact that a changed social order no longer "needs" classical scholars to the extent to which it did up to a couple of hundred years ago is not *in itself* necessarily sufficient to justify the dropping of the study of Latin, whose retention may possibly be justified on quite other grounds; and, from the fact that Russian is becoming a socially important language, it does not *necessarily* follow that it should be taught in schools, though the fact may be adduced in its favour.

We must, then, be prepared to treat with some suspicion these educational demands which are made upon us in the name of social "need", supposedly arising out of social change. The notion of "need" always implies an element of evaluation when it is used to persuade to a choice. But there is a further consideration. It is necessary always to examine the concept "change" when applied to human societies. To state that society changes is simply a shorthand way of indicating that certain specific changes take place at varying rates over certain lengths of time. Some social changes—for example in speed of transportation—take place very rapidly—that is to say, there are considerable changes over a short period of time; other changes—for example in fundamental moral or intellectual orientation—take place very much more slowly; and certain basic problems—for instance, those which pose questions relating to right conduct—seem to exist in all societies at all times of which we have record. When people stress social change, they are frequently concerned only with comparatively superficial manifestations of change; the deepest problems remain—what I imply by "deepest problems" should be sufficiently clear from the context. In view of the element of value involved in all educational decision, it is not unreasonable to expect educationists to pay some attention to the deeper "needs" of their pupils—needs which in this case recur from generation to generation and do not change with every technical advance; so that if one finds that, say, Plato and Shakespeare are still important, it is because they raised questions or analysed states of mind which are relevant, in the West, not to a particular phase of society but to the human condition as it is likely to be lived within the foreseeable future. Even without invoking a world of supra-sensible metaphysical reality, it is still possible to indicate some more or less permanent human problems which are not susceptible to changing fashion or increased technical efficiency—or are susceptible so slowly that this can be ignored. The answers we give may change slowly; some, at least, of the questions we ask do not.

At the opposite end to what might be termed the "community service station" notion of the role of the school is that which stresses learning for its own sake. When we talk about learning for its own sake, we mean, among other things, I think, learning which offers no direct social reward, which does not fit one for a job, which serves no current end of social policy. It is good in itself, not in instrumental good—a means to an end. The learner learns, it may be, because of the intrinsic interest which the subject-matter has for him, apart from any thought as to whether such learning will make him a better citizen, etc. At the same time, it *is* extremely difficult to conceive of learning which has no social repercussions whatsoever; it has frequently been pointed out that the attempt to classify human actions into two categories—actions which concern only the agent and actions that concern others besides the agent—is impossible to maintain:

> No action, however intimate, is free from social consequences. No human being can say that what he is, still less what he does, affects no-one but himself. (Quoted by J. C. Rees: "A Re-Reading of Mill on Liberty." *Political Studies*, Vol. VII, No. 2 (June, 1960), p. 115.)

At the very least, the activity of acquiring any intellectual discipline is likely to have some effect on the character of the person involved and is therefore bound, in some slight degree at least, to affect his conduct. Indeed, I suspect that the discussion as to whether one should acquire learning for social utility (or "need"), or "for its own sake" is activated by a quarrel involving two views of what constitutes the good society. What readily becomes sinister about the emphasis on social utility is the narrow range, comparatively speaking, of the activities which are permitted to the members of the society involved. Often the injunction to recognise social "need" is a bullying device to prevent other people from following interests of which we may disapprove or in which we may not be interested. That again is not to say that there are no learning activities of which it might be reasonable to disapprove—Fagan's school provides an admirable example; but each disapproval necessitates a specific investigation; and it must be recognised that from the *fact* that I cannot see the social utility of the particular sort of learning I am considering it does not logically follow that such learning is to be regarded as morally reprehensible.

(*b*)

We are also faced by suggestions concerning the social role of the teacher. Dewey expresses a certain view of that role:

> The teacher is not in the school to impose certain ideas or to form certain habits in the child, but is there as a member of the community to select the influences which shall affect the child and to assist him in properly responding to these influences. (John Dewey: *Education To-day*, p. 8.)

Dewey here points forward to a new conception of the teacher, a conception which has probably to some extent been influenced by a changed orientation in psychological studies; and the fairly recent interest in the functioning of primary groups, and the stress laid on group dynamics have helped to stimulate further the formulation of a new relationship within the class group. The teacher is no longer, in this view, to be regarded as an "authority", the representative, so to speak, of "objective truths" (4); in extreme cases he becomes little more than someone who registers consensus in group opinions. The ethical implications and presuppositions of this attitude have been recently examined by Mr Adrian M. Dupuis, in an article in the *Harvard Educational Review* (5). He begins by setting forth the aims of the people who hold this view of the teacher's function and then considers the implications of decisions reached on a group basis:

> . . . the major objective of education, at all levels (such people consider) should be social efficiency; i.e. school experiences should develop in students the skills and abilities necessary to interact with other individuals and groups in order to achieve social consensus. Realisation of this objective implies the necessity for training in group problem solving, which becomes the very heart of the educational process.
>
> What, then, is the nature of the group decisions? These conclusions arising from consensus are not considered right and better for all groups at all times but are at the best the means to intelligent action for the solution of the problem in hand. The teacher does not lead the student to the correct answer, for it is the group's prerogative to decide upon an answer. The implication is that there are no right and wrong answers, especially to normative problems, no right or wrong ways of doing things either in the classroom or in administrative affairs.

It is not difficult to see where such notions may have come from; the current socio-political emphasis on the democratic group process, involving problem solving and decision-making, is particularly likely to be friendly to such views of the teacher; implied, too, is a view of the superiority of majority to minority opinion. Such extreme procedures as those analysed by Mr Dupuis are not perhaps often met in schools in this country, apart from in the more "advanced" progressive schools; though ideas in the running of projects and phenomena such as school parliaments, which are sometimes encountered even in fairly orthodox schools, owe something to notions of this sort. Such views tend to historicism (the view that historical events are as fully determined by their antecedents as are physical events, and hence that historical prediction is possible) and ethical relativism; they grow out of, though, of course, they are not logically entailed by, the metaphysical presupposition that "all reality is in a state of flux".

These ethical and metaphysical presuppositions are commonly found among those who emphasise the notion of education as a "social process". The spectacle of social change induces an acceptance of flux as the ultimate reality of the world and a frequently accompanying scepticism concerning ethical absolutes. Thus Mannheim speaks of the socio-political realm as one in which everything is "in the process of becoming" (6); he rejects an "absolute permanent" synthetic view of the nature of reality (for such a view, he considers, would mean a "relapse into the static world view of intellectualism") in favour of a "dynamic" synthesis of different standpoints, one which is "reformulated from time to time". Because of the relevance of these theories of reality and truth to any discussion of the authority of the teacher—the teacher, that is, as the representative of "truth", deriving his authority from the nature of his "subject"—a fuller account of Mannheim's views is important. I would not wish to maintain, however, that Mannheim would support completely the conception of the teacher's function implicit in Mr Dupuis' analysis; though Mannheim does provide some justification for the alleged superiority of group understanding, and he does reveal the source of the relativism implicit in such a view.

Mannheim posits two criteria of truth, criteria which I shall distinguish as those of Objectivity in cognition and Effectiveness in action. I will begin by discussing his notions of Objectivity and of the nature of objective reality. Truth, according to Mannheim, depends upon a correspondence between subjective utterance and the reality of the object. But, of course, he believes in the "existential determination of knowledge". Briefly, this implies that qualitative knowledge is in some measure socially determined by the social position of the knower—"qualitative" knowledge he counts as knowledge apart from quantifiable, scientific or mathematical knowledge. This necessitates the rejection of any absolutes:

> The view that holds that all cultural life is just an orientation towards objective values is just one more illustration of a typically modern rationalistic disregard for the basic irrational mechanisms which govern man's relation to his world. . . . There is no norm which can lay claim to formal validity and which can be abstracted as a constant universal formal element from its historically changing content.

Hence "every point of view is particular to a social situation"; for

> We must realise once and for all that the meanings which make up our world are simply an historically determined and continuously developing structure in which man develops, and are in no sense absolute. (*Ideology and Utopia*, p. 76.)

The same notion is implied in his view of ethics:

> . . . an ethical attitude is invalid if it is oriented with reference to norms, with which action in a given historical setting, even with the best of intentions,

> cannot comply. . . . A theory then is wrong if in a given practical situation it uses concepts and categories which, if taken seriously, would prevent man from adjusting himself to that historical stage. (*Ideology and Utopia*, p. 84.)

Man then, is unable to achieve absolute ethical truth or contemplate absolute reality. Furthermore, he must keep up-to-date. The assumptions are that, in the first place, Reality is Becoming, or, as Engels puts it, "the world is not to be comprehended as a complex of ready-made things, but as a complex of processes"; furthermore, that Man is part of this process of becoming, and human nature results from the interaction of man and the world (7). Action and knowledge, indeed, coalesce in purposive behaviour:

> Not purpose *in addition* to perception but purpose in perception itself reveals the qualitative richness of the world in certain fields. (There is the) phenomenonologically demonstrable fact that in these fields the activist genesis penetrates into the structure of the perspective and is not separable from it.

How, then, does man achieve any degree of *objectivity* of view-point? Mannheim's answer is that he does so through comprehensiveness, through that is, the synthesis of a wide variety of social view-points:

> Totality . . . is not an immediate and eternally valid vision of reality attributable only to a divine eye. It is not a self-contained and stable view. On the contrary, a stable view implies both the assimilation and transcendence of the limitations of particular points of view. It represents the continuous process of the expansion of knowledge, and has as its goal not achievement of a super-temporally valid conclusion but the broadest possible extension of our horizon of vision. (*Ideology and Utopia*, p. 94.)

And, elsewhere, "pre-eminence is given to that perspective which gives evidence of the greatest comprehensiveness . . .". Hence it is possible that group consensus, arising out of a more comprehensive range of views, could prove superior to individual opinion.

Where action is concerned, Mannheim adopts the twin criteria of adjustment and fruitfulness, which meet in Efficiency: that is best which is best adjusted to the situation as it really exists, under the analysis of the synthetic view-point, and, at the same time, which gives the "greatest fruitfulness in dealing with empirical materials". As the becoming of the world is immanent in the historical process, accordance with such process provides the criterion of fruitfulness. As Maquet puts it: "Efficiency and objectivity find their common origin in the historicity of the political view" (8). It is implied, of course, that this immanent process constitutes progress; otherwise the ability to foresee and act in accordance with the emerging social situation could hardly be described in a value-loaded word like "fruitfulness": historicist moral theory tends to optimism:

> This ability to reorient oneself anew to an ever newly forming constellation of factors constitutes the essential practical capacity of the type of mind which is constantly seeking orientation for action. To awaken this capacity, to keep it alert, and to make it effective with reference to the material at hand is the specific task of political education. (*Ideology and Utopia*, p. 157.)

Indeed, Mannheim's analysis of the sociology of knowledge implies that the very discovery about the nature of thought such a conception of knowledge involves represents progress through the possibility it affords of increased rationality:

> . . . the sphere of the rationalisable and of the rationally controllable is always growing, while the sphere of the irrational becomes correspondingly narrower

This is to be the fruit of an increasing appreciation of the existential determination of knowledge:

> Whenever we become aware of a determinant which has dominated us, we remove it from the realm of unconscious motivation into that of the controllable, calculable, and objectified. (*Ideology and Utopia*, p. 169.)

It is indeed arguable, paradoxically, that there is implicit in this analysis of the sociology of knowledge in *Ideology and Utopia* an ethical norm in terms of the desirability of an ideal of absolute rationality.

The view that group consensus provides the best source of ethical truth, then, seems to rest on the assumption that group opinion transcends the individual view-point, affording that comprehensiveness which permits a more objective synthesis; and this manifests itself, according to historicist moral theory, in action which accords with the evolving social situation. Some such explanation would be needed to defend Mr Stuart Mason, for instance, when he explains why he decided to start the Leicestershire experiment:

> . . . however ill or well founded it may be the whole notion of segregation is steadily tending to accord less and less with the mood of the times. The social conscience may be unduly squeamish, it could be eloquently argued it is misguided, but undoubtedly it is stirring. I think it is as irresistible as the tide. It is better to take it at the flood.

Many sociologists, too, hold the view that, ethically, their function is to discern the trend of society and to work with it. This provides the basis of many of their educational recommendations. But such "historicist" views can be attacked on several grounds. They often conceal "absolutes" which they resolutely deny; and they rest on the unwarranted assumption that change (the trend) is always progress—or, to put it another way, that what is, or is about to be, is logically related to what ought to be, which, we have seen, it is not. Furthermore, even if we allow Mannheim's analysis of the sociology of knowledge a limited validity, it is certainly possible that *some* homogeneous groups at least may well be more subject to the "particularity of perspective" than might certain socially isolated individuals (Mannheim's élite of the intelligentsia) who are able to transcend conventional view-points. On the other hand, it may also be conceded that a socially heterogeneous group might on occasions achieve a synthesis of view-points which could transcend an individual outlook. My point in this context, however, is simply that there is no reason to assume that opinion derived from group consensus is *necessarily* superior to that of an individual—especially when the group consists of children and the individual is an adult (9). The teacher remains the central figure in the classroom. Furthermore, the views of the majority are in no way *necessarily* superior to minority opinion.

NOTES AND REFERENCES

1. I have drawn attention to the heinousness of this procedure in my "Fact and Value in Education", *British Journal of Educational Studies*, V (November, 1956), pp. 15-24.
2. The fallacy, that is, that "goodness" is completely defined by any of its alleged properties. Cf. Moore, G. E., *Principia Ethica* (Cambridge University Press, Cambridge, 1959), p. 10.
3. Mannheim, K., *Diagnosis of our Time* (Kegan Paul, London, 1943), p. 74.
4. I am aware that this characterisation of the teaching curriculum begs the question of the relative status, as knowledge, of the different "subjects". This obviously varies along the subjective-objective continuum; but all make their impersonal demands in relation to their different natures—whatever degree of "assent" (Newman's word) that nature may necessitate. Cf. Reid, L. A., *Ways of Knowledge and Experience* (Routledge, London, 1962), for a discussion of the problem.
5. Summer, 1957, p. 210-11.
6. Mannheim, K., *Ideology and Utopia* (Kegan Paul, London, 1936), p. 135.
7. The changed view-point of "progressive" seventeenth and eighteenth century educationists *vis-à-vis* the authoritarian and literary learning of the medieval and Renaissance periods can be summed up in the oft repeated tag—"Things, not words". The change from the eighteenth to the nineteenth centuries and our own day could be summed up in the phrase—"Processes, not things". Thus, to extend the quotation from Engels: "The great basic thought that the world is not to be comprehended as a complex of ready-made *things*, but as a complex of

processes, in which things apparently stable no less than their mind images in our heads, the concepts, go through an uninterrupted change of coming into being and passing away . . . has, especially since the time of Hegel . . . thoroughly permeated ordinary consciousness . . . (Hence) the demand for final solutions and eternal truths ceases once for all; one is always conscious of the necessary limitations of all acquired knowledge, of the fact that it is conditioned by the circumstances in which it was acquired." ("Feuerbach and the End of Classical German Philosophy.") This links up with the increasing interest in biological and organic science and the growing tendency to think in dynamic rather than morphological terms in psychology. Dewey makes extensive use of words like "process", "growth", "development", etc.

8. Macquet, J. J. P., *The Sociology of Knowledge, its Structure and its Relation to the Philosophy of Knowledge* (Beacon Press, 1951), p. 11.
9. The whole historicist position, of course, has been resolutely, and to my mind, convincingly, attacked by K. R. Popper: *The Poverty of Historicism* (Routledge, London, 1961).

PROBLEM-SOLVING AND SCIENCE TEACHING

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1. Introduction

INHELDER and Piaget have described (1) problem-solving situations taken from or similar to, those of school science. By means of these problems, they made a study of how children progress from the level of "concrete operations", when a "particular logical form is still not independent of its concrete content" (2), to the level of "formal operations", when abstract thought is possible. This article reports an attempt by the writer (3) to examine, from first principles, the solution of scientific problems by children in a normal school setting. Two more specific aims were also borne in mind: to relate the quality of children's thinking, while solving scientific problems, to mental age, and to consider the relevance of the results of the investigation to the teaching of science.

Two groups of children, both from the same comprehensive school, took part in the investigation. In each case the Simplex Group Intelligence Scale was given to about 20 children in each year group from first to fifth. The children tested were not specially selected for any reasons other than that they were willing to co-operate and that they were readily available at the time when most of the testing took place, i.e. during the lunch break. From the results of the verbal reasoning tests, two separate groups of about 60 children, whose mental ages were spread as evenly as possible over the range 11 + to 18 +, were selected. The children in each of these groups were taken individually through a series of four experiments. In practice, 57 subjects individually worked through each of the four experiments in the first series (Series I) and 54 subjects similarly worked through the second series (Series II).

During the course of the experiments, the subjects were placed in the familiar school situation in which the teacher wishes his pupil to "think for himself", but is ready at the same time to encourage and give hints where necessary. A "clinical approach" was, therefore, avoided and preference given to the spontaneous development of the problem-solving situation. Even so, the investigator always held in reserve a previously determined store of questions and hints, which were used to ensure that each subject was progressively brought to consider the main steps of the problem, up to the limits of his ability.

The subjects were taken individually and requested to "talk out" their solutions to the given problems. Every effort was made to record each subject's problem-solving performance fully and objectively. The word "record" is subsequently used to mean the original notes made by the investigator while a subject was attempting to solve a problem.

In order to investigate the relationship between problem-solving ability and mental age, it was necessary to rate each subject's performance in terms of progress made towards a completely insightful and logical solution of the given problem. It seemed more feasible to place the subjects into a few categories, or groups, rather than attempt to place fifty-odd individual solutions in order of merit. In order to accomplish this grouping, the following general method was adopted.

The records belonging to a particular experiment were carefully scrutinised in order to find some recognisable patterns of solution. All those subjects whose solutions followed a particular pattern were then placed together to form a group. For example, in Experiment 6 (described subsequently), those who failed to construct the required "seconds pendulum" constituted group 0. Those who succeeded, but were unsystematic in their experimenting and varied two factors (e.g. weight of bob and length of string) simultaneously at least once during their investigation, constituted group 1. Those who were systematic and varied only one factor at a time throughout, but failed to exclude weight, constituted group 2, while those who gained complete mastery of the problem constituted group 3.

After the records had been analysed in this way, each subject was given a score of 0, 1, 2, etc., for the experiment, corresponding to the number of the group into which his solution was placed. The scores obtained by each subject in each of the four experiments of Series I were then added together. The total scores, which provided an estimate of each subject's ability to solve the problems presented at the formal level, were then tabulated. From this table, calculations were made of the correlation between the ability to solve the problems at the formal level, and mental age and chronological age.

2. THE FIRST SERIES OF EXPERIMENTS

(*a*) *Experiment* 1

A demonstration experiment was first performed. In this the investigator demonstrated the action of acid, water and alkali on red and blue litmus papers. The subject then had his attention directed to three clear liquids, each contained in a burette and labelled A, B and C, respectively. He was informed that one of the liquids was an acid, one an alkali, and one water. A rack of test-tubes and a blue, very feebly alkaline, litmus solution (*b*), were also provided. The problem was to determine which of the three given solutions was acid, which was alkali and which was water.

It was demonstrated, by means of an extension experiment, that in order to solve the problem it was necessary for children to move from the passive observation of the concrete situation afforded by the demonstration experiment:

> "Both litmus papers are red in the acid, one paper is red and one paper is blue in the water, and both papers are blue in the alkali",

to a new level of understanding, in which the information was generalised, and comprehended in the form of propositions:

> "If blue litmus is turned red, and the solution is acid, if blue litmus remains blue, the liquid is *either* alkali, *or* water, etc".

It will not cause any surprise to practising teachers to learn that the experiment demonstrated clearly that, in the majority of cases, the children did not reflect upon the given information until they had to use it in a problem situation. The practical experience provided by the problem assisted in raising the level of their thought from the specific, concrete case to the general one.

(*b*) *Experiment* 2

Part A

Eight uniform wooden blocks were placed before the subject in random order. Four of the blocks were painted red and four blue. The subject was informed that the blocks fell into two groups with respect to weight: heavy and light.

The difference in weight resulted from the fact that three of the red blocks and two of the blue had been made from deal, while the remaining one red and two blue blocks had been made from a denser hard wood. All the light blocks weighed approximately 24·0 gm. and all the heavy blocks approximately 32·0 gm., so that it was difficult to distinguish between them by testing their weight in the hand.

The subject was asked to separate the eight blocks before him into two piles: heavy and light. A fairly well damped chemical balance (of the type used for making quick approximate weighings) was provided, but no weights, i.e. the blocks had to be compared amongst themselves.

It was made clear to the subject that all the heavy blocks were all *about* the same, but not necessarily *exactly* the same, in weight and that all the light blocks were *about* the same, but not necessarily *exactly* the same, in weight. At the same time, he was informed, a distinct difference in weight did exist between a heavy block and a light block. (When like pairs were compared, they either gave a nil deflection of the balances pointer, or at most, a deflection of two scale divisions. When unlike pairs were compared, the balance bumped down in favour of the heavy block.)

Only two subjects out of twenty-four with a mental age of less than 14-6 successfully separated the blocks into heavy and light piles. The critical weakness of these subjects lay in their inability to classify one block relative to another, as "about the same", or "not about the same", and at the same time to classify it with respect to the system as a whole, as heavy or light. For example, it frequently happened that the slightly heavier of two balancing light blocks was classified as heavy, even though it was light with respect to the system as a whole. In other cases, both of the blocks in the balancing pair were classified as light, because neither of them caused the balance pan to bump down! The possibility that both of the balancing blocks were heavy was not considered. The difficulty that children have in dealing with relative terms, such as heavy and light, before they reach the formal level of maturity, has, of course, been observed by Piaget (4).

It may be objected that the above is a very simple problem and that it has been treated in an unduly ponderous manner. There is, however, an important point at issue here. What may appear to be a simple practical task may, on analysis, prove to have a logical content which is beyond the capabilities of the vast majority of children with a mental age of less than, say, fourteen. Indeed, the results of the present experiment suggest that practical investigations of phenomena such as density, flotation and specific heat, which require an understanding of relative quantities, are likely to be beyond the understanding of children with a mental age of less than 14-6. This point of view is reinforced by the results of later experiments.

Part B

The blocks were placed in front of the subject in two rows. The left-hand row contained the five light blocks (three red and two blue) and the right-hand row the three heavy blocks (one red and two blue). A gap of about twelve inches was left between the end of the two rows. The subject was then asked,

Q. 1. Which are there more of, red blocks or light blocks?"

Q. 2. "Which are there more of, blue blocks or heavy blocks?"

In order to solve the problem, it was necessary for a subject to perceive that each block could be either heavy or light and, at the same time, either blue or red, and to mentally structure a double-entry table (5). Thus, there were four red blocks (irrespective of weight) and five light blocks (irrespective of colour).

Above a mental age of 16-3, no-one failed to grasp the point of the problem and to answer both questions correctly. Below a mental age of 13-8, no-one succeeded.

(*c*) *Experiment* 3

The subject was provided with a white powder and asked to carry out tests, with the aid of the apparatus and reagents provided, in order to decide whether the powder was a single substance, or a mixture of two different substances.

The reagents provided were water, in a beaker, and dilute hydrochloric acid, in a labelled bottle. The apparatus consisted of a rack of test-tubes, the usual apparatus for filtration, an evaporating dish, a Bunsen burner and a gauze and tripod. The white powder was a finely ground mixture of common salt and chalk.

All the correct solutions were based upon the fact that the salt dissolved in water, while the chalk did not. This allowed a separation of the powder into its constituents to be effected by shaking with water, filtering and evaporating to dryness. The acid was used for a confirmatory test: to show that the white residue of chalk left on the filter paper was chemically different from the white residue of salt left in the evaporating dish. (Chalk, calacium carbonate, effervesces with dilute acid, while common salt, sodium chloride, does not.) In order to throw more light on the nature of the reasoning processes concerned, other mixtures were presented, individually, to small numbers of intelligent fourth and fifth year pupils. For example, a mixture containing calcium carbonate (insoluble in water, but soluble in acid) and lead sulphate (insoluble in both acid and water) was used.

The evidence obtained suggested that the following reasoning processes were the ones which generally took place.

(i) First there was insight into the possibility of a solution: "If there are two substances in the powder, they will have different properties."

(ii) This idea was then more specifically related to the problem: "If the powder is a mixture of two substances, it may be possible to separate them. One of them alone may dissolve in either water and/or acid."

In view of the propositional nature of the reasoning required for the solution of this problem, it is not surprising that no-one with a mental age of less than 15-5 succeeded in solving it.

Many children experienced difficulty because they did not understand the general nature of the process of filtration. The results of the present experiment suggested that children do not reason formally with respect to scientific concepts before a mental age of 15 or 16. Thus, while children with a mental age of 12 or 13 may successfully learn to separate a mixture of salt and sand by solution and filtration, they will not automatically generalise this result, i.e. they will not reason that filtration is a general method for separating undissolved solid particles from a liquid. Emphasis of this point by the teacher and the provision of other different mixtures for separation, e.g. napthalene from charcoal by solution in alcohol, may help a child to see that the method is a general one.

Subjects often failed to discriminate between a solution and a suspension. Some thought that a solution was bound to be either coloured or cloudy, and that a clear colourless liquid could not possibly contain any dissolved substance. The general method of testing for a dissolved substance, by evaporation to dryness, did not seem to be understood. Some thought that a dissolved substance would "come out" of a solution if it were merely heated, or boiled. The trouble again appeared to be lack of sufficient suitable practical experience in the early part of the science course. Such "suitable practical experience" might include the evaporation of tap water from a watch glass standing over a beaker of boiling water, in order to demonstrate the presence of dissolved impurities, and the problem, "Does chalk dissolve in water?" might be investigated.

We see that in the early stages, we cannot expect children to generalise from a single example. Adequate concrete experience must be provided. Only then, and with the help of the teacher, will generalisation take place.

3. The Second Series of Experiments

(a) Experiment 5

The apparatus used was a form of balance. A single balance pan was supported by a thread, which passed over a pulley and supported one end of a chain. The chain hung in a U-shaped loop, its other end being supported by a hook. When a weight was added, a pointer, which was attached to the balance pan, moved vertically downwards over a scale. A 10 gm. weight lifted 17 links of the chain and depressed the pointer through 4 scale divisions. There were 85 links in the whole chain.

Two problems were set:

(1) Given a 5 gm. weight, a 10 gm. weight, and a rubber bung, to find the weight of the bung.

(2) To find the weight of the chain, by using the 5 gm. and 10 gm. weights and without dismantling the apparatus in any way.

Problem (1)

Only four subjects (out of fifty-four) found the weight of the bung after only two weighings, by using the method of direct proportion. For example, Subject 6:

> "I will find out how far down the scale the bung takes the pointer, then find out how far the 10 gm. will move it down the scale." He experiments. "The bung takes the pointer to 7. The 10 gm. weight takes it to 4. The bung weighs $10 \times 7/4 = 17{\cdot}5$ gm."

In other successful solutions, the subjects observed:

$$\begin{aligned} 6 \text{ units} &= 15 \text{ gm.} \\ 1 \text{ unit} &= 2{\cdot}5 \text{ gm.} \\ \text{therefore } 7 \text{ units} &= (15 + 2{\cdot}5) \text{ gm.} \\ &= 17{\cdot}5 \text{ gm.} \end{aligned}$$

For example, subject 14:

> "I cannot think how to begin." (Put the 5 gm. weight into the balance pan and see what happens.) "It stops at 2. Oh! I see now." She removes the weight and places the bung on the pan. "It goes down to 7." She removes the bung and places the 10 gm. weight on the pan. "It goes to 4. With 15 gm. it goes to 6, so the weight of the bung is 17·5 gm."

Above a mental age of 15-0, no-one failed to solve this problem, while below 13-0, only one subject out of eleven succeeded. Between the mental ages of 13-0 and 15-0 the pass rate was approximately 50%. The implication is that children are ready to cope with experiments in which they have to calibrate a scale for subsequent use, e.g. the graduation of a spiral spring, at a mental age of 13+. Until a mental age of 15-0 has been reached, however, they are unlikely to cope successfully with abstract theoretical problems based upon the same topic and requiring an understanding of metrical proportions.

Problem (2)

There were no successful solutions of this problem below a mental age of 15-6. The majority of successful subjects regarded the chain as being made up of 5 lengths of 17 links, each length weighing 10 gm. For example, Subject 16:

> (I want you to try and find the weight of the chain.) Pause. (How many links are supported by the lead shot (contained in the balance pan) with the pointer at zero?) "Twenty-seven; I will try the 10 gm. weight. There are 44 links held up now, so 10 gm. =17 links. There are 85 links altogether, so the weight of the chain is 50 gm. (How did you work that out?) "Seventeen goes into 85 five times."

The results suggested that the spontaneous application of metrical proportions to a scientific problem only took place at a mental age of 15 to 16.

(*b*) *Experiment* 6

The problem concerned a modified simple pendulum. A small brass stirrup, of weight 50 gm., hung from the end of a thread, the length of which could be varied. The stirrup served as the bob of the pendulum. Other weights, which could be either added to, or removed from, the stirrup, were also provided. The pendulum hung in front of a scale which enabled the displacement of the bob to be estimated. A stop-clock and a metre rule were also provided.

Initially the length of the thread was 60 cm. and the weight of the bob 80 gm. It was demonstrated that when the pendulum was set swinging, by giving the bob a small push from opposite the third mark on the scale, it completed exactly 18 oscillations in 30 seconds. The subject was then invited to make any alterations that were necessary, in order to obtain a pendulum completed exactly 15 swings in 30 seconds (i.e. a seconds pendulum).

The solutions of the subjects with mental ages below 14-6 all fell into the two lower groups. Subjects in Group 0 all failed to construct the required seconds pendulum. Those in Group 1 succeeded, but their experimenting was not systematic and showed little or no evidence of formal reasoning.

Formal methods of reasoning were evident in exactly 50% of the solutions of subjects with mental ages between 14-6 and 16-6, while above 16-6, success in solving the problem at the formal level rose to 80%.

Below a mental age of 14-6, the most pressing need appeared to be for training in making accurate and objective observations. The following exemplifies the kind of objective reporting which was found amongst these subjects:

Subject 37 counted 17 swings when she dropped the pendulum bob from scale mark 3, 16 when she dropped it from just beyond mark 5, and 15 when she dropped from well beyond 5, although the pendulum actually completed 17 swings in 30 seconds on each occasion.

A subject's lack of confidence in his own ability to produce satisfactory results gave rise to similar behaviour. Consider the following extract.

> Subject 35 drops from beyond 5. "16 (swings)." Repeats the reading. "16." Repeats the last reading. "15." Pause. (What have you learned?) "You must have all the weight on to slow it down and take it back as far as it will go." (Anything else?) "Yes, lengthen the string."

This subject saw no cause for surprise in the fact that the rate of oscillation changed from 16 to 15, although no change had been made in the conditions of the experiment. We may suppose that having gone through what she considered to be the correct experimental procedure, she thought that any discrepancy between her own observations and what she thought was "the correct answer", resulted from her own incompetence, i.e. that "the correct result" was there all the time, but that she had difficulty in capturing it. Once she obtained "the correct result", she felt that the experiment was complete. This child was obviously not in a position to consider which of the variables (i.e. length of thread, weight of bob, dropping point, impetus) were causal ones and which could be excluded as non-causal. It would appear that her immediate need was for more experience in carrying out simple experiments to investigate cause and effect relationships. For example, she might be asked to find the time for 50 oscillations using the same length of string and dropping point, but using three different weights of bob, or she might use the same bob and dropping point and find the time for 50 oscillations with the thread 40 cm., 60 cm. and 80 cm. long, etc. In this way she may be led to feel confident that the results obtained by her own careful observations were the real results. Not until then would she be ready for the next step, i.e. the exclusion of variables.

The table of results showed that between the mental ages of 14-0 and 15-0 there was a fairly sharp seing-over from non-formal to formal reasoning with respect to this problem. It is, therefore, reasonable to suppose that at the mental age of about 14-6 children are ready to investigate systems like the simple pendulum by the method of "holding all other things equal". It is assumed that the children will have become accurate and confident experimenters as a result of suitable experience at a previous stage. Now they may combine the results of experiments to investigate the effect of (*a*) dropping point, (*b*) weight of bob, and (*c*) length of string, on the rate of swing of a simple pendulum, so that the system is understood as a whole. Eventually and under the guidance of the teacher, the relationship $T \propto \sqrt{l}$ may be discovered. Problems involving more abstract thinking and involving such expressions as $T = 2\pi\sqrt{\frac{l}{g}}$, or $\frac{T_1}{T_2} = \sqrt{\frac{l_1}{l_2}}$, would appear to be more suitable for subjects who were thoroughly at home with the concept of the separation of variables. The results of this experiment suggested that this would be at a mental age of about 16-6.

4. RESULTS AND GENERAL CONCLUSIONS

The correlation between the total scores obtained by the subjects in Series I and (*a*) their mental ages, (*b*) their chronological ages, and (*c*) their spatial test scores, respectively, was calculated by the product moment method. The calculations were repeated for Series II. The results were as follows:

Series I

(*a*) Correlation with MA: 0·89 (standard error: 0·028)
(*b*) Correlation with CA: 0·73 (standard error: 0·062)
(*c*) Correlation with spatial-test scores: 0·72 (standard error: 0·064)

Series II

(*a*) Correlation with MA: 0·80 (standard error: 0·049)
(*b*) Correlation with CA: 0·72 (standard error: 0·071)
(*c*) Correlation with spatial-test scores: 0·79 (standard error: 0·051)

We see that the ability to solve scientific problems at the formal level was more closely correlated with mental age than with chronological age.

The possibility of a sex difference in problem-solving ability was investigated, but none was found.

The influence of personal qualities on problem-solving ability was also examined. No evidence was obtained to suggest that any factor other than mental age had a decisive influence on problem-solving ability, but it was confirmed that interest in the subject matter employed could be an important modifying influence.

In general, it was found that there was little ability to reason formally with respect to scientific problems before a mental age of about 13. From then onwards, this ability increased steadily with mental age. The actual mental age at which a problem was solved depended, of course, upon its difficulty. The difficulty of a problem was seen, however, to depend not so much upon its complexity, e.g. the number of factors involved, as upon the quality of the reasoning required for its solution. It would be difficult to imagine a less complex task than that of using a balance to separate some wooden blocks into two piles, heavy and light. Yet this task was accomplished successfully by only two children out of twenty-four in the 11-0 to 14-6 mental age range. Again, only one child, out of twenty-seven with mental ages below 16-0, was able to devise a satisfactory method for investigating a white powder in order to decide whether it was a single substance, or a mixture of two different substances. This was in spite of the fact that the technical processes required were of a very simple nature: solution, filtration and evaporation; and that a very strong hint of the method of investigation was given by the apparatus provided.

In experiment 5*b*, it was found that a problem requiring an understanding of a system of proportions was not solved below a mental age of about 16. On the other hand, in experiment 5*a*, it was found that children could solve a very simple problem of proportions empirically, e.g. by calibrating a scale and taking readings from it, at a mental age of about 13.

A comparable time-gap, between the ability to solve a problem empirically and the ability to solve a similar problem by formal reasoning, was demonstrated by the results of two other experiments. In the first, it was found that subjects were able to solve a simple problem about the action of acid, alkali and water on litmus, by empirical means, at a mental age of 13. In contrast to this, the problem presented in the second experiment, which used the same subject matter but required formal reasoning for its solution, was not mastered by anyone with a mental age of less than 15.

Let us now consider, in the light of these results, the reasoning processes which we can expect to find and the kind of subject matter that is most appropriate, for each of the following: (1) children with a mental age of 11 to 14, (2) children with a mental age of 14 to 16, and (3) children with a mental age of over 16.

(*a*) *Mental Age* 11-14 *Years*

We saw, in experiment 1, that a problem requiring children to think in terms of simple propositions, e.g. "If blue litmus remains blue, then the solution is either alkali or water", was beyond the capabilities of children with a mental age of less than 13. Few children with a mental age of less than 14 were able to comprehend that a block of wood might be "equal" to another block of wood, and "light" with respect to the system as a whole. We see then, that it would be unreasonable to expect children to understand topics containing the concept of relativity, e.g. specific gravity, at this stage.

In experiment 5*a* the relationship:

$$\text{markings on scale} = \frac{5 \text{ gm.}}{2 \text{ divisions}} = 2{\cdot}5 \text{ gm. per division,}$$

was not understood by more than 50% of them with a mental age of 14. This suggests that the approach to the teaching of density, for example, at this stage should not be in terms of the relationship:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

On the other hand, there is no reason why children at this level should not find the weight of 1 c.c. blocks of different materials, e.g. deal, oak, aluminium, etc., or of 1 c.c. of various liquids. The name "density" might then quite reasonably be given to the weight of 1 c.c. of a substance.

The systematic investigation, and the accurate reporting, of such reactions as the action of heat, or the action of water, on various substances, will also form an important part of scientific training at this stage.

(*b*) *Mental Age* 14-16 *Years*

We should expect children of this mental age to be able to investigate and solve simple scientific problems empirically, but to have difficulty in generalising the results of an experiment, or sequence of experiments. For example, several children at this level of maturity, when investigating a simple system of moments, were able to calculate where to put a 20 gm. weight in order to balance a previously positioned 40 gm. weight. They reasoned that since 20 gm. was half of 40 gm. it would have to be placed at twice the distance from the fulcrum. In spite of this they were unable to predict where a 30 gm. weight would have to be placed to balance the 40 gm. weight and failed ultimately to perceive that $W_1 \times L_1 = W_2 \times L_2$.

In the pendulum experiment, it was found that children began to investigate the problem by varying one factor (other than the period of oscillation) at a time, at the level of this mental age. Returning to our example of density, it follows that we may now expect a child to understand that by holding volume constant he may compare the relative weights of different substances. The phenomenon of flotation might also be investigated.

In experiment 2*b* we saw that double entry classification of concepts was possible from a mental age of about fourteen onwards. A suitable chemical problem at this stage might then be to distinguish between potassium sulphate, potassium carbonate, magnesium sulphate and magnesium carbonate by means of practical tests.

(*c*) *Mental Age Over* 16 *Years*

It was found in experiment 3 that there was little progress with a problem requiring the setting up and testing of a hypothesis before a mental age of 16. In another experiment, disjunctive reasoning (either A is acid, or B is acid, or both A and B are acids) occured only once before a mental age of 15 years and 10 months.

The total weight of evidence obtained supported the view that we should not expect children to solve abstract, theoretical problems in science, until they reach a mental age of about 16. At this stage it is also possible to undertake topics requiring an understanding of metrical proportions, e.g. Boyle's Law, Ohm's Law, etc. in physics and valency, equivalence, etc., in chemistry.

We see, from the above discussion, that the concentric method of presentation (6) of the science course has a psychologically sound basis. We have seen, however, that logical growth during adolescence is a gradual process. It follows that the transition from a qualitative approach to a quantitative one should also be gradual. It is possible that the loss of interest which is often observed amongst third year pupils results not only from an increase in the mathematical and theoretical content of the course, but also from the abruptness of the transition from a concrete to a formal approach.

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UNIVERSITY ENTRANCE; SELECTION RATIOS FOR ARTS AND SCIENCE STUDENTS TAKING A "USE OF ENGLISH" PAPER

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INTRODUCTION

A PREVIOUS article in this Journal (1) showed how unfavourably the marks awarded to science students, in two examinations which were basically tests of sixth-formers' ability to write English, compared with those awarded to art students; the failure rate for the scientists was more than twice as high as that for the arts candidates. A later article published elsewhere (2) suggested that if a pass in Use of English were demanded as a qualification for admission to universities, not only would a larger proportion of scientists than of arts students be rejected, but the ablest of the scientists would be more likely to fail than their counterparts among the arts specialists. A further investigation has now provided evidence to support the view that the correlation between Use of English and A level results for scientists will be appreciably lower than the corresponding correlation for arts students.

In March 1962 the Durham School Examinations Board set an experimental Use of English paper, marked by one examiner, to 169 sixth-form pupils from seven schools which had volunteered to provide the Board with some experience in conducting an examination of this kind. The Board made available all the information needed for the investigation, but naturally bears no responsibility for what follows; the necessary calculations were made and checked with the help of a group of teachers-in-training in the Durham Colleges.

THE SAMPLE

The paper demanded the following: a piece of continuous prose writing, one of the alternatives offered involving the interpretation of data presented in diagrammatic form; a summary of the main argument in a printed passage of about 1,000 words, and answers to a number of questions dealing, for instance, with matters of vocabulary, the significance of particular phrases, and certain sections of the argument; and explanations of faulty thinking or phrasing in a number of short printed passages.

The sample of schools consisted of one technical high school, two mixed grammar schools, and two boys' and two girls' grammar schools. Unfortunately 21 of the candidates took no A level examinations that year, and four others offered only one subject apiece, leaving 144 who took A level papers in two, three, or four subjects. A handful of candidates offering three subjects had chosen them from both arts and science sides, and in these cases the overall classification into "arts" and "science" was determined by the weight of specialisation; a candidate, for example, who took English, History and Biology would be classed as an arts student. Fortunately no corresponding difficulty arose among the 31 candidates who offered only two subjects and the two pupils who offered four. The choices of boys and girls as between arts and science are shown in Table I, the figures in brackets showing the number of candidates who offered two subjects only.

TABLE I

CHOICE OF SPECIALISATION AMONG 144 CANDIDATES OFFERING TWO OR MORE A LEVEL SUBJECTS

	Girls	*Boys*	*Totals*
Arts	43 (13)	24 (5)	67 (18)
Science	17 (7)	60 (6)	77 (13)
Totals	60 (20)	84 (11)	144 (31)

RESULTS

Within individual schools there was marked disparity between the numbers of arts and science candidates, and statistical techniques involving analysis of variance were impracticable. As a preliminary step in the investigation, the product-moment correlations between Use of English marks and marks for the more popular A level subjects were calculated, the effect of differences between schools being ignored. The correlations for each of seven subjects taken by 25 or more candidates are shown in Table II. It is clear that the low correlations for the science subjects are not due to a restricted range of A level marks.

These results suggested that it would be worth while to correlate Use of English results with academic performance generally, making

TABLE II

Subject	*No. of candidates*	*Standard deviations for the subject in the 1st column*		*Standard deviation for Use of English marks*	*r*
		(a) cands. in the sample	*(b) all cands. taking the subject*		
English Literature	43	7·71	9·64	12·88	·63
French	25	8·19	10·93	10·67	·38
History	35	6·97	10·88	13·33	·21
Geography	33	9·17	9·45	13·20	·14
Mathematics (1 subject)	36	13·52	19·09	10·26	·09
Chemistry	41	11·05	14·41	9·60	·02
Physics	63	12·04	14·24	11·34	·01

separate calculations for arts and science students. Accordingly, the standard deviations of the marks awarded to all the Board's candidates taking A level examinations in some 20 subjects were calculated, and the A level marks of the candidates who had taken the Use of English paper were then scaled to yield new distributions with a mean of 50 and standard deviation of 10. The sigma method of scaling was preferred on the grounds that in several subjects the total entry was small, and that it was better to rely on the experience of the examiners and preserve the shape of their distributions than to use the simpler percentile method of scaling. The scaled A level marks for each of the candidates in the sample were then averaged, a questionable procedure the alternative to which was even more distasteful. It can be argued that it is unreasonable to invite comparison between the average scores of those who offered two subjects and those who offered three or four. On the other hand, one was reluctant to discard the information provided by 31 out of a meagre total of 144 candidates, and some of the two-subject pupils achieved results which suggested that they might have been regarded as very acceptable candidates by at least some university faculties.

Two-thirds of the sample had average scaled marks of 50 or higher. The means and standard deviations for Use of English and for average scaled A level marks, and the correlations between these marks, for arts and science students separately, are shown in Table III.

From the point of view of A level marks, arts and science candidates form comparable groups; the means are practically identical, and the ranges do not differ greatly. The arts and science means for Use

TABLE III

	No. of cands.	*Average scaled A level marks*		*Use of English marks*		*Correlations between Use of English and average scaled A level marks*
		Mean	*S.D.*	*Mean*	*S.D.*	
Science	77	52·74	7·44	44·92	12·12	·158
Arts	67	52·77	6·63	51·04	12·86	·489

of English differ significantly ($P = \cdot 01$), but the difference is probably exaggerated in this sample, the scientists in one of the schools achieving notably poor results. However, the four distributions—English and A level results for arts and science candidates separately—do not deviate significantly from the normal curve. The two correlation coefficients are significantly different ($P = \cdot 05$), and the difference cannot be attributed to the effects of selection. The differences between schools operate in such a way as to reduce both correlations, the within-school correlations being ·213 for scientists ($N = 72$) and ·575 for the arts students ($N = 63$) (3), the difference falling just short of what is required for significance at the 1% level. If those candidates who offered only two subjects are omitted, the within-schools correlations are ·396 for arts candidates ($N = 44$) and ·121 for the scientists ($N = 58$); the difference is no longer significant, but the reduction in the size of the correlations is due to restriction in the range of marks rather than to other changes in the samples.

With such small numbers and such disparity between the proportions of boys and girls in individual schools, it has not been possible to control the sex differences shown in Table IV. It could be argued that the relatively high correlation for arts candidates is due to the preponderance of girls taking arts subjects, girls of eighteen, particularly perhaps those in girls' schools, being more likely to work to capacity in all subjects than the boys, most of whom are scientists. However, the girls' results have little effect on the science correlation; the within-schools correlation for boys offering two or more science subjects is ·207 ($N = 56$). None of these science—Use of English correlations is significantly different from zero.

TABLE IV

AVERAGE SCORES FOR BOYS AND GIRLS (arts and science separately)

	SCIENCE			ARTS		
		Mean scores			*Mean scores*	
	No.	*U. of E.*	*Scaled A level*	*No.*	*U. of E.*	*Scaled A level*
Girls	17	47·5	54·8	43	51·7	52·9
Boys	60	44·2	52·2	24	49·8	52·6

DISCUSSION

The possibility must be considered that, if scientists are compelled to pay more attention to their English studies in order to gain admission to universities, there will be a marked change in their mean score in Use of English, and in the English—science correlation. It seems reasonable to suppose that the upper limits for the scientists in this sample would be lower than the figures for the arts students, many of whom take English as an A level subject, and most of whom will practise some form of continuous writing in each of their specialist studies. In six of the seven schools there appears to be little prospect of minority time being increased, and in any case there are grounds for believing that the difference between arts and science students, in respect of performance in tests of English, is not purely a result of specialisation in the sixth form (4). *Some* improvement in the average Use of English scores can be expected as the result of increased extrinsic motivation; one would have greater confidence in the likelihood of *substantial* improvement if it involved only the reproduction of material which had to be learned by heart, or if large-scale adjustments could be anticipated in sixth-form syllabuses and time-tables.

An improvement in the scientists' mean score in Use of English will not produce an increase in the correlation unless improved scores are proportionately more frequent amongst the abler scientists. The theory of group factors is not based on sixth-form populations, and in fact Burt's early work in this field was carried out with children in the elementary schools, so that specialisation can hardly account for the difference between the correlations for arts and science students at sixth form level. It is probable that students usually specialise in the field in which they have achieved the best results; relatively high v is more likely to be a cause than a consequence of specialisation on the arts side. Any marked rise in the correlation for scientists would seem to imply that the verbal factor was playing an increasingly important part in success in scientific studies at sixth-form level, or that g was accounting for more of the variance in performance in English, or that the scientists' intrinsic interest in English studies was being fostered by the development of new approaches; or that the general education of the scientist, through his greater familiarity with topics beyond the range of his strictly scientific interests, had led in turn to improved verbal discrimination, and to greater ability to communicate his thoughts within the conventions appropriate for affective as well as cognitive aspects of language. One may doubt whether such changes will be a function of the time spent in English studies in the sixth form, or whether they will be recorded in the near future.

It would be sounder to argue that the types of question set, or peculiarities in the sample of schools or pupils, make it unlikely that results such as those reported in Table III will apply to the country as a whole. One of the seven schools appears not to have entered its best candidates for the Use of English paper, and the poor performance in this paper by the candidates from another school has already been admitted. Six of the schools are located in one narrowly-defined geographical area where—for all the evidence there is to the contrary—tradition or socio-economic background might conceivably produce a-typical results. Bernstein (5), having surveyed some of the research into the effects of experience in childhood on verbal and intellectual development, maintains that the educational progress of working class children is hampered by their relative failure to acquire "formal language". It could be that there is a higher proportion of working class pupils in this sample than would be found in the whole population of university applicants; on the other hand, poor linguistic development appears to be closely associated with retarded intellectual development generally, and the scientists in the sample are intellectually able at least to the extent that they have been allowed to present themselves for examinations at A level. They appear, in fact, to comprise a better-than-average sample of A level candidates.

There are no grounds for ignoring the possibility that any peculiarities in the sample may have raised, rather than lowered, the correlation between science and Use of English. The reliability of the measures employed imposes a limit on the size of a correlation, and differences between examiners, one of the factors in low reliability, have in effect been controlled in this enquiry. It is not impossible, of course, that the correlation would turn out to be non-linear, and that the best scientists would achieve good results in English; but non-linear correlations are unusual with measures of academic ability, and of the thirteen candidates in the sample who secured a minimum of two A gradings (6), five, all scientists, failed in Use of English, four of them by a substantial margin.

Even if the experimental sample proves to be reasonably representative, one cannot predict with any confidence what the position will be when Use of English papers are used for university selection. A correlation coefficient is meaningful only in terms of a specified range in the performances correlated, and the range in this sample may well differ from that which would be found for bona fide university applicants. One would need to know the proportions of arts and science students—boys and girls separately—applying to universities, as well as the proportions of places available, and even then a number of other factors about which we have as yet little information would render prediction hazardous. It will be salutary, however, to make a number of assumptions and consider the consequences if the state of affairs obtaining with the sample were to apply to the country as a whole. So we take correlation coefficients of ·58 for art students and ·20 for scientists, and ignore sex differences and the complications arising from differences between the numbers of places available in the various honours schools, faculties, colleges and universities, and between the numbers of applications made for those places. We assume further that the top 25% of the sample—from the point of view of A level results—would be acceptable university applicants (23·6% obtained a minimum of two B gradings), and that the Use of English pass mark is so fixed as to fail 39% of the candidates (50% of the scientists, 28% of the arts students), as was the case with the experimental paper (7). Then two in every five of the "acceptable" scientists will fail in Use of English, as compared with fewer than one in ten of the corresponding group of arts students. Table V shows, for various pass levels, the approximate proportions of "acceptable" university applicants who would be denied a qualification in English. For example, if 20% of all the science candidates fail in the English paper, 14% of those whose A level results would have entitled them to a place will be rejected; with the same failure rate for the arts students, only 5% of the "acceptables" will be barred by their English results.

TABLE V

PROPORTIONS OF "ACCEPTABLE" UNIVERSITY APPLICANTS FAILING IN USE OF ENGLISH

	Failure rates in Use of English			
All science candidates *or* all arts candidates:	(*a*) 50%	(*b*) 40%	(*c*) 30%	(*d*) 20%
"Acceptable" university applicants—science:	38%	30%	22%	14%
"Acceptable" university applicants—arts:	20%	14%	9%	5%

With the pass level used for the experimental paper, some 23% of all "acceptable" candidates would be rejected—little less than the

26·7% of "qualified" applicants who, according to the A.U.T. (8) failed to gain admission in 1962. Had the conditions obtaining in the experiment applied to university admissions in that year, the science faculties would have been unable to fill their vacant places even if they had been offered to all those who had already applied but who obtained only bare passes in their A level subjects. Pursuing this fantasy a little further, we should have found physicists, chemists, biologists . . . who had been admitted to universities on no firmer grounds than that their English was better than their science. On the basis of the A.U.T. figures it would have been desirable to set the pass mark so as to fail not more than, say, 20% of the "acceptable" scientists (so as to leave faculty interviewers some room for manoeuvre); this would have entailed a failure rate of about 22% *for the whole entry*, and a pass mark seven marks below the one actually chosen. Clearly, the pass level for the Use of English paper must not be determined without any reference to the minimum A level performance acceptable to university selectors, and to the proportion of applicants in excess of the available places.

It has been admitted more than once in this paper that the experimental sample may not be a representative one. On the other hand there appears to be no evidence at present to justify rejecting out of hand the possibility that selection ratios similar to those in Table V will obtain generally. In the absence of such evidence one must hope that the failure rate in Use of English will be kept at a much lower level than has been the case with some of the experimental papers, or that at least some universities will exercise their discretion in employing a potentially equivocal method of discriminating between candidates. Oxbridge can doubtless afford to press for a high pass mark; other universities may do so only to their own discomfiture.

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1. "Sixth Form English and University Entrance", *Educ. Rev.*, XIII (1961), 163-170.
2. The Use of English Paper and University Entrance", *Durham Res. Review*, IV, 13, 1-7.
3. The reduction in numbers is due to the loss of degrees of freedom in calculating within-school sums of squares and products.
4. See e.g. "The Performance in English Language, at O Level, of a Sample of University Students", *Brit. J. Educ. Psychol.*, 30, 40-46.

5. Halsey, Floud and Anderson, "Social Class and Linguistic Development", in *Education, Economy and Society* (New York 1961).
6. The system of grading is that recommended in para. 28 of the third report of the S.S.E.C., "The General Certificate of Education and Sixth Form Studies" (1960).
7. The Board, knowing that the entry was not confined to genuine university applicants, but having no other knowledge of the academic level of the candidates, decided on a pass mark which—as in A level examinations—would fail about 35% of the candidates.
8. See e.g. *The Times Educational Supplement* for 23rd November 1962 (p. 684).

RELIGIOUS CONCEPTS AND RELIGIOUS ATTITUDES

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PART II

THERE have been few precise studies of the growth of religious concepts in childhood. However much purely verbal methods of religious teaching may be distrusted as producing a merely superficial understanding, an adequate understanding of any religious truth requires an explicit vocabulary based on correct religious concepts. Unfortunately there has been little study in any field of the growth of such abstract concepts and their verbal expression, as Piaget has observed (1).

A French study of philosophical concepts by Bonnardel (2) indicated the extent to which full understanding depends on both increased age and superior intelligence, and his results suggested that maturity as well as verbal ability affects such forms of thinking. Another study with somewhat younger children indicated that if terms are not correctly understood, both erroneous and unrelated ideas may be associated with them or else a term can remain so fluid in the meaning attributed to it that it may change its function from sentence to sentence (3).

Such studies help to show the ease with which a religious term such as "humility" can be confused with "being humiliated" by children whose religious concepts are as yet inadequately formed. But before the present study is described, brief reference must first be made to some previous investigations in this field.

An often quoted American study is that of Kuhlen and Arnold (4), who compared the responses of children aged twelve, fifteen and eighteen to a number of religious statements, and showed the increasing tendency with age to question or reject orthodox belief. But this has more to do with religious attitudes than with meaningful insight into religious concepts, and suggests little of the process of development. Bradbury, in a study of English children, gives an interesting account of some phases of development, and shows that in backward children crudely anthropomorphic ideas may still be found as late as fourteen years of age, about which age material concepts are found to disappear in most children (5).

In a similar investigation, Bradshaw encountered the increase of doubt with age which Kuhlen and Arnold had found in American adolescents, although negligible atheism was recorded (6). Uncertainty, rather than disbelief is suggested as the reason for this, and Bradshaw is explicit in stating that even if early belief was due to imitation, it retained an essential function when children had grown to an age of independent judgment.

Another comparable study was carried out by Dawes, who included a representative group of modern school children in his sample, and found overwhelming acceptance of the idea of God, with the cause of doubt intellectual rather than moral. The most marked idea of God was found to be his power, and almost as popular the concern that God was thought to have for the individual. Ideas of fatherhood, or power and of creative activity are shown to be the dominant concepts, and are important in meeting the needs of the growing individual in his attitudes to security, authority and reality (7).

These studies have two major interests in common; the first is their concern to examine the growth and nature of doubt in adolescence and the second is to inquire into the ideas of God held by children in this age-group.

A classic study is that of the American McDowell (8), who undertook a painstaking investigation into the ability of children in Roman Catholic schools to understand the conceptual significance of the terms used to describe God the Father in the Roman Catechism. On the basis of the replies made by children in a large number of personal interviews, he constructed a rigorous test of more than 300 items, which after careful validation, was administered to a considerable population of children over the whole range of school ages. The test attempted to discover the extent to which children could understand such theological terms as divinity, providence or omnipotence, the extent to which their thinking of God conformed to the instruction that they had received about the nature of God, and the extent to which anthropomorphic ideas of God were present in their thinking.

A brief summary cannot do justice to his work. He gives many instances of the misconceptions and erroneous or illogical ideas which persisted in the children tested, notwithstanding their formal training in denominational schools. It did not follow that erroneous or partial ideas were replaced by more mature concepts with increasing age, although as would be expected there was a regular improvement in children's ability to understand from childhood to adolescence. But the learning process, as he observed it, seemed to stop in the upper grades, a fact which puzzled him and made him comment that "there is obviously a great deal of room for improved learning at secondary school level". In the light of what follows, it must be stressed that McDowell's complaint was not that learning was not complete by the end of school life, but that no learning appeared to take place in the last two years of it, just at the time when one might expect increased maturity to bring with it a significantly increased rate of learning.

McDowell did not pursue this issue, and in his discussion of the mean scores of the groups he pays no attention to the extent of the scatter: statistically it is always dangerous to ignore the standard deviation!

A similar result had emerged from another earlier study of more general religious terms. Bose constructed a test of sixty items, based on children's free responses, and administered it to almost 2,000 children in the age-range eight to twelve in twenty-two American denominational schools, thus exploring children's responses to a large body of more general religious terms (9). In the discussion of his findings he comments that while children had formed few definitely wrong ideas "vagueness and confusion as to the meaning of 'cue' words and phrases are outstanding characteristics of the responses made by the children . . . which shows a lack of training and experience regarding the life-situation summed up in these terms. The junior children seemed to understand the terms as well as the seniors in the majority of cases." This last sentence is important: in what other subject taught in schools are the concepts of twelve-year-old children of normal intelligence no more advanced than those of eight years of age?

It is unfortunate that none of this research material seems to have been considered by the Research Committee of the Institute of Christian Education before they undertook their inquiry into the attitudes and religious beliefs of boys and girls in secondary modern schools. Despite the care with which the survey was carried out, it adds little to the knowledge already gained by earlier work in the field, although it makes its descriptive study available to a wider public, and couples with it a welcome discussion on the approach and method of religious instruction in the senior forms of these schools (10). But while many instances are given of the confused ideas and half-formed concepts of these children, no effort is made to ascertain what pattern of development governs the growth of religious ideas.

It is clear that considerable problems remain unsolved. Under what conditions does religious learning take place, and what is required if it is to continue through adolescence? To what extent are religious doubts associated with less positive religious attitudes? How does religious activity affect religious learning? Is it possible to describe the conditions in which mature religious beliefs are most likely to develop? It was to undertake a preliminary exploration of such questions as these that the present investigation was initiated.

Two new concept tests were developed, both of them based on written responses of 500 secondary school children. The first test consisted of twenty items, in which five possible definitions to a frequently used religious word comprised each item. The terms tested covered a wide range, and were chosen in co-operation with specialists in the field. The definitions, taken from those freely offered by children, had been selected with care, and validated against the judgments of a representative group of theologians and specialist teachers. A preliminary test had first been adminstered to groups of children and to a separate group of theologically qualified adults and a technique of item analysis used to simplify it. The five responses to each word always consisted of one description judged to be significantly better than the others. Two typical items are:

The Church

1. The house of God
2. All the Christians throughout the world
3. A group of people who gather together to pray
4. The people that govern and maintain the Christian religion
5. A place to worship God

Faith

1. Believing in God and putting your whole trust in him
2. Belief that God will protect you in danger
3. An outward visible sign of an inward spiritual grace

4. Believing wholly in the teaching of Jesus and his commandments
5. Holding fast to what is right, whatever comes along

The second test was concerned with the child's image of God. It was neither desirable nor possible to conduct this study in such detail as McDowell (although parts of his test have subsequently been used with groups of English children, and comparable results obtained). Rather, it was intended to explore the extent to which orthodox ideas of God might also be associated with orthodox ideas about the other Persons of the Trinity, an aspect which apparently had nowhere previously been considered. Once more, from a considerable number of written statements, representative phrases were taken and submitted to a competent panel of judges, and the preliminary test based on their findings was simplified after subsequent administration. In this way a test was evolved which comprised thirty items of a "True/False" nature. Typical items are:

God created the world and the stars
God is a father whom we should always obey
Jesus was just a normal man, but very religious and unselfish
Jesus was no ordinary person
The Holy Spirit means the presence of God with us at all times
The Holy Spirit is the spirit of someone holy, like a saint

While these tests were under development, the attitude scales previouly described were also constructed, and also a questionnaire about religious behaviour. Experience had shown that with guaranteed anonymity secondary school children gave answers to questions about their religious activities which appeared to be truthful and consistent. Questions related to such matters as attendance at church, bible-class or Sunday school, frequency of bible-reading and private prayer, and a self-assessment of religious involvement on a seven-point scale. The tests were then administered to nearly 2,000 children in four secondary schools, as described earlier.

The changes in religious attitudes that were observed have been described in the previous article, and so when the scores for the concept tests were examined it came as no great surprise to discover relatively little changes in scores with age; the only significant difference appeared on first inspection to be a somewhat higher score consistently maintained by girls. (Higher scores are associated with greater insight). This constancy of score was more marked with the test of the Image of God. No age-group of girls differed significantly from the girls' mean score; the boys' scores indicated a very slight decrease in score with increasing age. In view of this, the scores were dichotomised in each age-group, as with the previous attitude scores, and separate calculations made for the church-going and the non-church-going groups. It at once became apparent that the results for the conceptual test of the Image of God produced a developmental pattern almost identical with that of religious attitudes. Church-going groups maintained a fairly constant score in every age-group, with a slight tendency for the girls to score half a point higher in the oldest group, while boys tend to score a point lower in the highest groups. But the non-church-going groups showed a consistent decrease in score with increasing age, exactly as proved to the case with the attitude scores, the boys showing a greater decline than the girls. The scores for the groups are given in Table I.

TABLE I

SCORES OF SECONDARY SCHOOL CHILDREN ON 'IMAGE OF GOD' TEST

Form	*Boys*		*Girls*	
	Church-going	*Non-church-going*	*Church-going*	*Non-church-going*
1	21·31	19·93	21·25	21·68
2	21·04	20·69	21·18	18·05
3	21·41	19·43	21·83	20·77
4	20·97	19·14	20·74	19·89
5	20·65	16·52	21·49	21·04
6	19·23	14·31	22·50	18·00

When the individual components of the test are examined in greater detail it becomes clear that with girls, ideas of God, of Jesus and of the Holy Spirit all develop alike; with the boys a much greater rejection of orthodox ideas of Jesus is to be seen, even among the church-going groups. The results at once show the reason for some disagreements between previous studies; unless allowance is made for the growing difference in attitudes and in ideas of the Godhead between the church-going children and the remainder, any differences between groups will be invalidated by the concealed differences caused by varying proportions of church-goers. Undoubtedly this factor explains McDowell's apparent cessation of conceptual growth in his tests with older children; children's willingness to identify themselves with orthodox statements is an attribute of attitude rather than of purely conceptual development. Without positive attitudes conceptual development does not take place, and with a decline in attitude there came also a decreased willingness to endorse orthodox ideas, if not also a decreased insight into their meaning. That there are substantial deviations around the mean scores must be stressed; it is, however, clear that a great measure of verbal recognition of orthodox ideas is normally achieved before secondary school age, and that these ideas are reinforced for only a minority of children, the minority most closely associated with the Church. As in all fields of learning, conceptual growth is dependent on actual experience, and the church must obviously play a unique part in extending a child's experience of God in its worship and fellowship, as well as by its teaching.

Limitations of space prevent any detailed discussion of responses to individual items, but the rejection of crudely anthropomorphic ideas by the great majority of children must be noticed. Only in the most retarded groups did such ideas linger, and then they were still to be found even in the fourth years, where one child in ten of both boys and girls endorsed as true such statements as "God looks like an old man with a long white beard". The idea of God as Creator—"God created the world and the stars"—was always accepted by at least 90% of the church-going girls, but never by more than 75% of the church-going boys age 14 or more. Of the other groups, in the upper ages almost half the girls and almost three-quarters of the boys rejected it. "God is like a father, whom we should always obey" was accepted by almost all younger children, but older children tended to reject it, boys more than girls, and non-church-goers more than church-goers. But increasing maturity of thought in all groups could be discerned in the response pattern to the statement "God never lets people suffer whom he loves very much"; there was little difference in the responses of boys or girls, church-goers or otherwise, but a steady increase in the proportion of correct endorsements from about half the eleven-year-old children to 80% of the sixteen-year-old children. Boys, rather than girls, tended to reject the idea that "God is wise and loving" as they grew older, so that a quarter of the sixth form boys doubted it. But this growth of doubt is exactly as described by Kuhlen and Arnold, and discussed earlier.

"Jesus was a teacher who helped us to understand God" presented difficulty to only a small minority of older children, but "Jesus was God's son, sent to tell the people about God" produced the familiar pattern of acceptance by all younger children, and increasing rejection by older children, so that in six forms, while 92% girls agreed in the church-goers, only 54% of the boys agreed and in the non-church-goers, only 52% of the girls and 22% of the boys agreed. An almost identical point of view was found in responses to the statement "Jesus was not really the Son of God", which was increasingly endorsed as children grew older.

Greater confusion of thought was to be found, as might be expected, when ideas about the Holy Spirit were examined in detail. "The Holy Spirit cannot exist, for there are no such things as spirits" was rejected by more than 80% of the church-goers, but almost 50% of the older non-church-goers agreed with it. But "The Holy Spirit is a gift sent from God, such as Art" secured agreement from rather more than a third of every group in every age, and such response patterns showed that even among the older church-going groups there was a great deal of uncertainty.

Results from the test of general religious concepts remain to be discussed. Once more, the significant pattern was found to be related both to age and to church-going. Among children with no church background little alteration took place with age, older girls scored only slightly more than younger girls, and older boys slightly less. In the church-going groups a normal learning pattern could be seen, with regular advances through older age-groups, and again, girls scored higher than boys at every level. The extent of this becomes clear in Table II.

TABLE II

MEAN SCORES OF SECONDARY SCHOOL CHILDREN ON A TEST OF RELIGIOUS CONCEPTS

Form	*Boys*		*Girls*	
	Church-going	*Non-church-going*	*Church-going*	*Non-church-going*
1	7·38	6·16	6·82	6·62
2	7·53	6·27	7·65	7·22
3	8·59	6·78	9·39	7·22
4	9·09	5·90	9·37	6·55
5	8·93	5·38	10·05	8·72
6	9·68	6·62	12·47	7·48

When interpreting these figures, it must be remembered that there is a substantial standard deviation associated with them, greater among the non-church groups, and tending to increase also in the older groups. But while this indicates the considerable individual deviation that may be observed from the general pattern, *the trends as a whole are clear. While it is rare to find regular specific teaching about the theological meanings of some of these basic terms, teachers may assume that children become increasingly familiar with them. The results show that there is a considerable body of children for whom this is not true: these children both reject orthodox ideas, with their turning from more positive religious attitudes, and fail to gain any increased insight into the conceptual significance of religious vocabulary.*

A considerable difference is to be found between separate items and their response patterns. Thus "Faith" seemed to be understood correctly by almost all the children tested, who recognised the best description is "believing in God and putting your whole trust in him". Here is a concept which obviously is learned before the age of eleven by most children. On the other hand, not only are theological terms such as "Grace" items of considerable difficulty to many children, but such concepts as "Humility". Many children confused this with "being humiliated" and the item differentiates very clearly between the different groups already described. More than one child in ten made no attempt to give any response to the item, and twice that proportion thought it meant either "a feeling of anger when you are laughed at" or alternately, "when you are made to look small". Lack of insight into the meaning of humility may also be a comment on the society in which these children live!

In all the programme of concept testing, the effect of mental ability was constantly under consideration. It might well be that high scores in so verbal a test as this might only indicate a high level of verbal ability. That this is not the case is already evident from the clear distinction in test scores due not to differences in verbal ability, but to differences in religious behaviour. This was further established by factorial analysis of all test results. Such an analysis was undertaken at the University of London Computer Unit, using W. L. B. Nixon's programme for Hoteling's Principal Components. The result, given in Table III, shows that without any doubt a general religious factor accounts for almost half of the variance in all scores, apart from that of Mental Age, and this approximate measure of verbal ability, which dominates the second factor, has associated with it far less of the variance of the concept test; most of the residual variance of the Image test, which dominates the third factor, still remains largely independent of Mental Age.

Comparable results are being secured in a further research pro-

TABLE III

PRINCIPAL COMPONENTS OF TEST BATTERY CORRELATION MATRIX

	FACTORS		
	I	II	III
Mental Age	-·005	·912	-·293
Image of God	·638	·062	·670
Attitude to Religion	·835	-·152	-·238
Attitude to the Church	·861	-·192	-·260
General Religious Concepts	·635	·490	·258
Religious Behaviour Score	·815	-·066	-·208
Associated Variance	48·53%	19·01%	12·81%

gramme, in which children's religious learning is tested against a number of factors which might influence it.

The results show that contrary to the judgment of the Spens Report, religious teaching does not generate its own interest, but rather, as Professor Niblett has stated, "Religious education, in essentials, is an education of attitudes and awareness . . . a turning of the soul to light. To think of it more superficially is to deceive oneself about its nature (11)". That such education of attitudes is of fundamental importance is the outstanding conclusion of the Institute of Christian Education survey, *Teenage Religion*, referred to earlier. It is evident that a primary instrument in communicating religious attitudes should be the community life of a church, with both the fellowship and the worship which children should experience in it. But many children are without this regular involvement, and schools should not be blamed if their success is small with such children—the record of the churches themselves with children from unchurched homes is not outstanding. Yet without the interest generated by positive attitudes, inadequate and even confused ideas are likely to persist into adult life, when the task of re-education becomes even more difficult. The new ecumenical awareness which becomes more and more apparent in church life, and the consequent end of a great deal of tension between the churches on educational matters makes possible much more experiment in the area of church and school relationships, and bold and imaginative experiments are being undertaken (12). Such partnership, coupled with classroom approaches as described by Loukes, in which there is constant emphasis on the relevance of religious belief, ought to carry those involved further towards a solution of these problems.

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THE ORDER OF CONCEPT DEVELOPMENT STUDIES IN TWO FIELDS

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SECTION II

CONCEPTIONS OF CONSERVATION OF QUANTITY AMONG PRIMARY SCHOOL CHILDREN

1. INTRODUCTION

In the previous section repetitions of Piaget's experiments into number concepts were shown, on the whole, to confirm the order of achievement which he found. It was then suggested that this should be expected because mathematical concepts, including number concepts, are hierarchical; that is to say, advanced concepts cannot be realised until a succession of elementary concepts have been mastered. This was contrasted with concepts of conservation of quantity in which it was suggested that there appeared to be no inevitable order of achievement. For example, it was pointed out that conservation of weight can be demonstrated, whereas conservation of substance must be realised by each child as the result of his experiences and his appreciation that substance is unaltered unless additions are made or some substance is removed. We have therefore questioned whether conservation of substance is realised, on the average, two years earlier than conservation of weight as claimed by Piaget.

To test understanding of conservation of volume Piaget used displacement of water by objects immersed in it (1). He found that in such experiments young children believed that the rise in water level was due to the weight of the object, and that this level would change as the area of the object in contact with the base of the vessel was altered. He concluded that it was only when children realised the separate role of weight and size that they predicted the rise in height correctly. He attributed the relatively late age at which this concept was achieved to the need to co-ordinate the roles of both properties of the objects. However, when we consider the nature of the experiments it again appears questionable whether this concept should necessarily be achieved later than those of conservation of substance or weight. In the first place, to understand that apparently identical bodies of very different weights make the water rise the same amount may involve understanding that weight is irrelevant to the result, but the way to realise this is by performing the experiment. If a false belief is entertained a single experiment will dispel it, unless the child is so young or so backward that he is still in Piaget's first stage of making intuitive judgments and ignoring contradictions. In the second place, to understand that objects of equal size but different appearance make the water rise the same amount is, once again, testing understanding of conservation of substance. It seems probable that children who have experiences of inserting objects in water will understand conservation of volume, measured in this way, so soon as they have understood conservation of substance. In brief, our considerations suggest that this is a matter of experiences and that the logical argument which follows is based on these experiences. As we shall show for one experiment experience is essential; in this case logical argument based on most people's experiences is inadequate to arrive at a correct conclusion.

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* Association of Training Colleges and Department of Education.

With these criticisms in mind, tests of conservation of substance, weight and volume were prepared and samples of children were drawn from school practice schools in six areas. The sample is therefore very much more varied than in any other study reported; it consists of small numbers of children drawn from a large number of schools. As in the case of number concepts the tests were administered by students who were directed by Mathematics lecturers: Clacton (Mr Lamb), Liverpool (Mr B. W. Jones), Eastbourne (Mrs Moss) Kenton Lodge, Newcastle (Mr Oley), and Bletchley (Mr Holland). A few results were also obtained from Bristol (Miss Sowden).

2. THE TESTS

Section I: *Conservation of Substance or Mass*

1. Material: Equal quantities of water in two exactly similar glasses and three small glasses.

"If you have that glass of water to drink and I have that one will you have more to drink, or shall we both have the same, or shall I have more to drink? . . . I'm going to pour yours into three small glasses. Now I have this one to drink and you have all those glasses of water to drink. Will you have more to drink, or shall we still both have the same, or shall I have more to drink? How do you know? . . . Suppose I poured yours into ten very small glasses. Would you still have the same amount to drink then?"

2. Material: plasticine.

"Make two balls of plasticine that are just the same size. . . . Now roll one into a sausage. . . . Is there still as much plasticine in the sausage as there is in the ball?"

3. Material: as for 2.

"Now break the sausage into pieces. . . . Is there still as much plasticine in the ball as there is in all the pieces?"

4. Material: ring segments arranged one above the other

"Which one is bigger?" . . . Reverse the segments. "Which one is smaller?" . . . If the child fails to laugh, to look puzzled or to comment that it isn't possible, ask "Can it really be larger and then smaller?"

5. Material: glasses from 1, jug of water, two glasses to compare: one tall and thin the other shorter and broad.

"Here are two glasses. One is short and fat, the other is tall and thin. Can you find any way to show me which glass holds more? You may use the water and the other glasses if you want to."

Section II: *Conceptions of Weight*

1. Material: A balance of the kind with pans attached at both ends (easily made from meccano), plasticine.

Put two equal balls of plasticine in the pans. "These two balls of plasticine weigh the same. They just balance." Take one off. "Flatten this one like a biscuit. . . . Do you think it still weighs the same as the ball? . . . Why (not)?" (Note whether the child wishes to balance it again to check or to find out). "If we flattened it still more until it looked like a pancake would it still weigh the same?"

2. Material: a long spill and a small stone (the stone just heavier).

"Can we tell by looking which of these is heavier? "How do you know?" or "Why not?"

3. Material: two equal biscuits.

"These biscuits weigh just the same." (show that they do) "If I break one in pieces like this (take one off and break it into about six pieces) will the pieces weigh the same as the whole biscuit?" (Plasticine may be preferable as it breaks more cleanly than real biscuits.)

4. Material: three weighted match-boxes covered in different colours for easy identification, the balance.

"Use the balance to find out which of these boxes is heaviest and which is lightest." If the child hesitates record that he does so but say "Weigh them two at a time."

5. Material: as for 4, and an additional box heavier than only one of the original three.

"We will put the match-boxes you weighed in order. This one is the heaviest, this is the lightest, and this one is in the middle." (lay them in order.) "Now here is another box. See if you can find out where it should come."

Section III: *Conservation of Volume*

1. Material: Two equal glasses of water and two equal balls of plasticine.

"If we put a ball of plasticine into this glass of water what will happen? Let us mark the top of the water and then put the ball in . . . (use a pen to mark the glass). . . . Now it is in and the water has risen. . . . Let us mark the top of the water again. . . . Suppose we put the other ball in that glass, would the water rise the same amount? . . . Flatten that ball out like a biscuit. . . . Now if you put the 'biscuit' into that glass would the water still rise the same amount? . . . Why do you think that?"

2. Material: a glass of water, salt and a tablespoon.

"If we put a tablespoon of salt into the water what will happen to the water? . . . Will it go up? . . . Now suppose we stir the salt, what will happen? . . . When the salt has all dissolved so that we can't see any of it will the water still stay up where it is now? Or will it go down again to where it was? Tell me why you think so."

3. Material: a ping-pong ball and a ball of plasticine of equal size.

"Feel these balls in your hands. They are just the same size but one is quite heavy and the other is light. . . . When I hold the ping-pong ball under the water . . . the water goes up. If I put the ball of plasticine in instead would the water go up just the same amount, or more, or less? Why do you think that?" . . . "If I put in a very heavy stone, just the same size, would the water go up more then? (or "still more then" or "still less then" according to previous answers.)

4. Material: two used cylindrical torch batteries (or weighted cylindrical cartons) and equal glasses of water.

"You see these are just the same? I am going to put this one upright in this glass of water. If I put this one lying down in the other glass will the water rise the same amount, or more, or less?"

3. Results

Before making comparisons between all three of the sections on conservation it is of interest to consider the first two sections only. Results are given in percentages, with a weighted average for the overall percentage of passes, as this compensates for the different numbers in each age-group.

Section I: *Conservation of Substance*

Item	*Age*: 4·10-5·9	5·10-6·9	6·10-7·9	7·10-8·9	8·10-	*Weighted Average*
1. glasses of water	10·2	20·9	40·5	58·5	63·0	38·6
2. balls of plasticine	46·9	62·5	72·0	69·7	85·7	63·4
3. ball and pieces	24·5	58·3	70·0	72·2	73·4	59·9
4. ring segments	38·6	62·0	63·4	71·4	90·7	65·2
5. glasses to compare	4·1	6·9	7·3	23·4	29·6	14·3
number tested items 1 and 5	(49)	(72)	(42)	(53)	(27)	
items 2, 3, and 4			(64)	(121)	(49)	

In this section only small differences were found between children rated as bright, average or dull, and sex differences were not significant.

Section II: *Conservation of Weight*

Item	*Age*: 4·10-5·9	5·10-6·9	6·10-7·9	7·10-8·9	8·10-	*Weighted Average*
1. balls of plasticine	33·3	45·0	48·9	29·2	58·3	42·9
2. spill and stone	0	5·0	6·3	5·5	8·6	5·1
3. biscuits	47·7	44·7	60·2	74·4	81·0	62·0
4. 3 weights in order B	50·0	51·5	51·7	69·5	93·0	63·4
G	36·4	48·0	42·4	63·4	60·8	50·2
5. 4 weights in order	27·5	33·3	39·7	43·0	62·5	41·2
number tested, item 1	(48)	(60)	(41)	(41)	(36)	
items 2-5	(48)	(60)	(63)	(109)	(58)	

In this section differences between children rated bright, average and dull were larger, being considerable in items 3-5. In item 4 boys proved significantly better than girls in putting weights in order.

As in number concepts it is evident that conservation of quantity is not understood instantaneously in all situations. Our sample finds it easier to understand that substance is conserved in the case of balls which were equal until one was elongated, next most easy in the case of a ball and pieces of an equal ball, and more difficult in the case of glasses of water. Conservation of weight is more readily understood in the familiar case of a biscuit and pieces of an equal biscuit than for the ball of plasticine and an equal, but distorted ball. Comparison of the two pairs of matched items, I.2 with II.1, and I.3 with II.3, suggests that there may be greater difficulty in understanding conservation of weight than of substance if the material used is identical, but slight change in the experiment so that the material weighed is more familiar offsets the difficulty of the concept. Indeed, a better order can be made if the tasks are put in order of familiarity instead of being classified by the nature of the concept. Plasticine as a play material and biscuits to eat are familiar, and shapes are often played with, but weighing plasticine is somewhat unusual, and glasses of water to play with are rarely provided. There is, therefore, little evidence for Piaget's second stage in which children understand that substance is conserved but believe that weight may vary with shape. We find no clear-cut development; even at ten years a child may be confused about conservation of substance in some contexts though he understands conservation of weight in others.

We are left with two items which appear to involve simple comparisons which are easy to make if concepts of conservation of substance and weight are fully mastered. To compare the capacity of two glasses involves only filling one and pouring its contents into the other, or measuring smaller quantities in turn into each; but less than a third even of the oldest group could find solutions. In contrast with this sample it is of interest to mention the experience of the writer (6) with children of six and seven years from Infants schools in London. No less than twelve of them (20%) solved this problem, doing so quickly and confidently; but all three schools from which the children were drawn provided exceptional opportunities with play materials, including water. Again, this appears to support our belief that familiarity with the material plays an important part in success. There is also a possibility that results are less favourable if tests are made by students during a brief contact with children, than by an experienced investigator during a more prolonged period of testing.

The question relating to the stone and spill amply confirmed Piaget's experience that children have an absolute conception of weight, at least in some contexts; "Stone" they said "is heavy". But, unlike his sample, many of the same children had no difficulty in comparing weights when given a balance. They appear to be at his second stage; if the difference in density is great enough they assume the more dense object is heavier, if it is slight, or if the objects differ little in size, they see the necessity for weighing.

In summary, there is so far little evidence of a hierarchy of concepts, some of which must be achieved before others become available; there appears, rather to be a multiplicity of unrelated situations which must each be met before the concept of conservation can be realised in each case.

When we proceed to the repetition of some of Piaget's experiments concerning *conservation of volume* we find some remarable results.

Section III: *Conservation of Volume*

Item	*Age*: 4·10-5·9	5·10-6·9	6·10-7·9	7·10-8·9	8·10-
1. balls of plasticine	28·6		33·3	35·5	31·2
2. salt in water	30·0		53·0	20·7	48·4
3. equal balls of different weights	8·6		19·1	3·2	9·4
4. tin in two positions	26·5		50·0	35·5	37·5
number tested	(35)		(42)	(31)	(32)

It is obvious that change of percentage of successes with age is unpredictable, except that there is a tendency for the oldest Infants to do better than younger or older children. There is no difference in proportion of successes between children rated "bright", average or dull. The only consistent difference is between the sexes.

Percentage successes:

Item	1	2	3	4
Boys	39·5	43·0	11·8	42·0
Girls	23·8	32·8	9·7	31·7

We have already remarked in the Introduction that these tests require understanding of conservation of substance together with knowledge of what happens to the level on inserting different objects in a trough or glass of water. The first of these is truly a concept; we can only give children experiences of changing shape of equal quantities of substance and hope that they will realise in time that the quantity of substance is conserved. The second is hardly a concept; it is a piece of factual knowledge whether water will rise on the insertion of an object. Whether this is known depends on having experience of inserting objects in water. There seems no reasonable doubt that it is this combination of a concept with an easily verified fact which we are testing in repeating Piaget's experiments. Since there is no progress with age, nor difference due to intelligence, the most probable explanation is that the experience with water is lacking among most of our sample of children. The substantial difference between the sexes tends to confirm this; it is boys who play more often with toy boats, submarines and divers and who may therefore be expected to make this observation more readily. Further, it seems very improbable that the children are consciously, if at all, separating the roles of weight and size mentally, as Piaget suggests; the ability to do so arise from various observations. In the first place, children know what happens rather than why it happens, and their knowledge relates to specific instances only. That this is true also for adults in the case of scientific concepts is evident in item III.2. In Piaget's experiment (1, Ch. 4.) the dissolved substance was sugar; we substituted salt because it was cheaper and it dissolved more quickly. However, teachers of science pointed out that when a solute dissolves in water the volume of solution is less than that of the water and undissolved solute. In the case of sugar, if its volume is only one quarter of that of the water, the contraction is very slight; but in the case of salt, for the same proportion, the contraction is approximately one part in thirty-five. It follows that children who argued "logically" that the volume should remain unchanged were ignoring some aspects of the situation and were, in fact, wrong. In the case of sugar the decrease would be so slight (one part in three hundred and sixty) that ordinary observation could not lead to its detection. However, this item serves to illustrate the importance of observation and experience in the formation of concepts. Reasoning logically, a child may make the hypothesis that the volume should be unchanged when the solute dissolves; but this does not represent the highest level of thinking in relation to conservation of volume; he must proceed from there to verify or reject the hypothesis. Although Piaget and Inhelder chose a substance which would behave according to most people's expectation, it would appear that, even in this case, a more sceptical attitude would show a higher stage of thinking. It is curious that those children who believed the volume to be conserved, who were placed at the highest stage (1, pp. 128,9) were among the oldest children questioned; whereas those who showed reasonable doubt (1, pp. 121, 127) who were placed at a lower stage were, in general, several years younger.

Additional evidence for the importance of experience was provided by repetition of similar experiments in conservation of volume performed by teachers of the A.T.M.* with children aged seven to sixteen years (7). Although there was a marked improvement in understanding of these concepts among secondary school pupils there were, nevertheless, some fifteen-year-olds who did not know that the rise in level of water on inserting an object depended on its size and not on its weight. Boys and girls of good intelligence who had studied science for several years were still unaware of this fact. Presumably they lacked a basis of relevant observations on which to base their reasoning.

As essential experiences have not been provided in so many cases it is worthwhile to stress the need for experience at all stages in forming concepts of measurement. These may be thought of as belonging to the scientific field where relations which hold good with one material need not necessarily hold good with another; unlike concepts of number in which the nature of the objects used is irrelevant. But even in the latter case children do not argue from logical principles until they have had experiences of matching objects, counting them, putting them in order, etc. As Piaget has shown practical experience is essential to the acquisition of elementary concepts. But we would stress the need for experience at later stages. At first children's concepts are vague, or apply to particular situations only, and may not be expressed verbally. Later they take the form of hypothesis: "The water will fall a little" or "They should weigh just the same", which are verified or modified as a result of diverse experiences.

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* Association of Teachers of Mathematics

4. CONCLUSIONS

Summarising the main conclusions for Section II

1. Piaget's order of achievement of concepts of conservation of substance and weight is, on the whole, not borne out. Success in these sections is greater for items where the materials used are familiar.

2. Although concepts of conservation of volume are achieved later this appears to result from lack of relevant experiences.

3. In concepts of conservation of substance and of weight there is considerable improvement with age.

4. Only in concepts of weight is there significantly greater success for intelligent children than for average or backward ones.

5. Boys are significantly more successful than girls in comparing three weights and in all concepts of conservation of volume.

6. Basic concepts of conservation of quantity were, in general, less well understood among all Primary school children than were elementary concepts of number among infant school children only.

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7. Beard, R. M., "Children's reasoning: a repetition of some of Piaget's and Inhelder's experiments by members of the A.T.M.", *Mathematics Teaching*, No. 21 (Winter 1962).

BOOK NOTICES

JOHN WOODWARD, *British Painting: A Picture History* (Vista Books, London 1962. 42s.).

H. W. VANSON, *A History of Art: A Survey of the Visual Arts from the Dawn of History to the Present Day* (Thames & Hudson, London 1962. 84s.).

GERMAIN BAZIN, *A Concise History of Art*. 2 vols. (Thames & Hudson, London 1962. 12s. 6d.).

DOUGLAS FRASER, *Primitive Art* (Thames & Hudson, London 1962. 35s.).

VICTOR W. VON HAGEN, *The Ancient Sun Kingdoms of the Americas* (Thames & Hudson, London 1962. 42s.).

RICHARD LANE, *Masters of the Japanese Print* (Thames & Hudson, London 1962. 35s.).

IN a *Picture History of British Painting*, the Keeper of Paintings at the Birmingham Art Gallery has brought together two-hundred-and-fifty illustrations representative of British easel painting from the sixteenth century to the present day. Such vigorous selection cannot but give a very personal flavour to the collection which in no way detracts from the interest or value of this volume.

Mr Woodward has chosen his examples with great care. He has not been content with the easily obtained and familiar, but has included about eighty previously unpublished illustrations in his effort to show what is the best work of those artists who he believes to be significant. Each plate is accompanied by a short descriptive statement which occasionally places the example in the context of the artist's work, and sometimes includes a thought-provoking quotation. These quotations also tantalise for seldom does the author give their source. Each of the nine chronological sections of the book has a short introduction which emphasises "certain salient points" affecting artists and trends during the period under consideration.

Within the covers of this slim volume Mr Woodward has provided a pleasantly varied pictorial record showing the development of easel painting and at the same time, concisely revealing some of the roots of "the Englishness of English Art".

Yet, just as "No man is an Iland, intire of it selfe", so Mr Woodward shows how Hans Holbein's arrival to work in England, brought new life and new vision to painting. Every artist owes much to his interaction with the physical and intellectual environment of his time and place. The furthering of our understanding of the metamorphosis of art and how this is brought about by influences at work in and around every artist, can but deepen our pleasure in art forms of the past and present.

In attempting to do just this, both Professor Janson and Mr Bazin present in historical sequence a survey of art covering twenty-thousand years. A formidable task if it is to be anything more than superficial. Both works are scholarly and illuminating, yet very readable, and because of their individual viewpoints, complementary to each other. It is enlightening to compare the treatment of common material in these works with that given to the same material by Professor Gombrich and Dr Arnold Hauser.

Mr Bazin deals with his sections about ancient civilisations, the Far East, and pre-Columbian archaeology in a particularly helpful way. Each of these chapters has an introduction which gives the reader an historical frame of reference. With the Far East the author goes further and very succinctly shows how the oriental artist differs from his western counterpart in his handling of form. Yet within this grouping, Mr Bazin ably outlines those fundamental differences in religious attitudes which distinguish Indian from Chinese aesthetics.

Mr Bazin concludes with a concise review of the various ways in which the work of art has been interpreted from the time of Vasari to Panofsky. In his own interpretation, he is concerned to emphasise how tensions resulting from man's reactions to the world as he knows it, affect the form which he creates.

Is there a connexion between the twentieth-century search for the symbolic value of art forms, the recognition of the uniqueness of the individual, and the steadily growing sensibility of western man to archaic and exotic art? There is little doubt that primitive art had a seminal influence on western art during the second half of the nineteenth century. Growing familiarity with the work of the Fauves, the Cubists and the Expressionists, has extended our vision and enabled us to enjoy something of the potent beauty of exotic images, without realising their true significance.

In his description and analysis of the arts of primitive man, Dr Douglas Fraser, keeps a nice balance between the viewpoints of the art historian and the anthropologist. Throughout this very comprehensive account, the reader is continually being confronted with strangely haunting forms from Africa, Asia—Oceania and America. However, the author is not content with this initial aesthetic impact. Wherever possible, he assiduously and precisely indicates the social or religious function of the work. Such non-aesthetic factors, dependent upon the artist's mastery of the acceptable language of forms, may suggest why western and native judgments on primitive art, differ so profoundly.

But Dr Fraser does not limit his sights to the function of the object. In a most interesting and able way he considers the evidence in support of the different theories which attempt to explain why similar artistic forms emerge far away from each other in time as well as in space.

The book jacket claims that this is the first work on the subject by an art historian who systematically covers the whole field. Dr Fraser's accomplishment does not rest here for he reveals most ably the perceptions and sensibilities of so-called primitive man, in a way which cannot but enhance the reader's general appreciation and extend our "patterns of imagination".

In the last section of this book, reference is made to the problems associated with the occurence of highly developed sophisticated art forms among American Indians who apparently knew nothing of the plough and the wheel. The Exhibition of Mexican Art which toured European capitals about ten years ago provided for many people the first opportunity to see pre-Columbian work and to become aware of its powerful quality.

Among ethnographers and archaeologists intrigued by the problems associated with study of these art forms is Victor Wolfgang von Hagen. In his book *The Ancient Sun Kingdoms*, he brings together the results of his thirty-year-long search for clues about the life and work of ancient man in Central and South America. For much of this time he has lived in the country studying the terrain and any other factors which might have some bearing on the mystery. His findings support Dr Fraser's view that the art of the archaic Indian civilisation was an integral part of the daily life and spirit of the people.

Like *Primitive Art* this is a well produced book. Among its three hundred illustrations are many of the author's photographs, and some delightful reproductions of drawings made by Aztec artists for the Spanish chroniclers during the sixteenth and seventeenth centuries. The complex nature of the Aztec, Maya and Inca cultures is reflected in the extent of their art ranging over architecture, town-planning, sculpture, jewellery, woven fabrics and ideographic writing and glyphs.

The dignified Eagle Knight of the Aztecs, the lively dancing figures from the Zapotec cultures, the massive and awesome Olmec heads, and the mysteriously smiling faces of the Totomacs are but a few of the astonishing aspects of expression apparent in the sculptural forms. It is no reflection on the author's careful attention to detail that through this work the reader becomes more aware of the questions yet to be answered.

Mr von Hagen is above all a humanist. The selection and interpretation of his material together with the shape which he has given to it within the covers of this book, has given life to the people of the Aztec, Maya and Inca cultures. It speaks much for his sincerity and enthusiasm that he has been able to do this while conveying something of the suspense and fascination of the archaeologist's quest for ancient man in the Americas.

LUCY BURROUGHS

In *Masters of the Japanese Print* Dr Lane has charted the emergence and growth of the Japanese wood-block print during the eighteenth and nineteenth centuries.

Western critics have recognised the importance of these prints, though it is obvious from this book that the artists best known in the West, like Hokusai and Hiroshige, were not either the most vital or the most typical of the printmakers during these two centuries. Degas, Toulouse-Lautrec, Whistler and Beardsley, and many others, found qualities of clarity and simplicity and an intriguingly different attitude to composition in the work of these masters which proved a stimulating and enlivening influence on their own work. It is salutary to be reminded that in Japan Hokusai was considered to have achieved a synthesis of Western ideas of perspective and atmosphere and the more Oriental qualities of clear iconography and simple drawing.

There is such a coolness and detachment about most of these prints (the notable exception is the Kabuki scenes), that the author's emphasis on the erotic aspects of "ukiyo-e" painting and printmaking comes as something of a shock. Does he emphasise this side of it too much, or is it just impossible for us to see with the eyes and mind of a Japanese? In a book of this kind it is not possible to reproduce the franker scenes mentioned by Dr Lane but no matter how pornographic the subject matter it is difficult to imagine that one's reaction would be other than that of extreme admiration for the cool beauty of the colour and the elegant simplicity of the shapes.

The chosen illustrations are unhackneyed and well reproduced. By themselves they would be well worth the price of this volume. There is more to the book than this, however, and the author's graphic description of the social changes, the rise of a new merchant class, the demand for new forms of entertainment and new means of recording these for a large public, is an enlightening comment on the prints.

The vitality went out of Japanese printmaking with the widespread use of photography. Dr Lane's chapter on twentieth-century prints from Japan is rather sad, and makes one even more doubtful of the virtues of "international art". Is there, as Professor Carstairs suggested in one of his recent Reith lectures, some kind of necessary connexion between vital art movements and particular local circumstances?

ERIK FORREST

M. V. C. JEFFREYS, *Personal Values in the Modern World* (Pelican Books, 1962. 3s. 6d.).

Summary. Professor Jeffreys here examines our educational needs against the background of the contemporary world, and holds that the central concern is the maintenance and enhancement of personal values. In his prologue he examines the concept of the personal, and concludes that personal status involves unique identity together with rational and moral responsibility. Part I gives a sketch of the present predicament. For the ordinary person the world is hard to understand, because of the vast scale of political and economic organisation; because of the increasing speed of social change; and because of increased dependence upon and conformity to complex machines. Moreover, there is much confusion and uncertainty about moral values, and increased cynicism and materialism. Finally, Professor Jeffreys considers and comments on the phenomenon of mass culture, which not only dilutes standards but gives unprecedented power to its purveyors. In an excursus the political and industrial problems created by the scale and impersonality of modern organisations are described. In Part II, the conditions for the enhancement of personal values are considered. A coherent view of life is needed—one which unites an understanding of the relations between different branches of knowledge, and an acceptance of a master-idea, viz. the sacredness of the human personality. But such coherence presupposes in turn proper communication, having shared feeling as a basis. Further the stimulation of voluntary activities is needed to counteract depersonalised passivity. In all this, the problem of creating a good free society is essentially an educational one. Professor Jeffreys, in Part III, surveys education in the light of these conclusions. He argues that sixth-form work must be reshaped to stop the present lop-sided specialisation; that there should be a vast expansion of opportunity for courses of further study once people have started earning their livings (thereby relieving pressure on first-degree courses); the institution of a certificate at sixteen for Secondary Modern pupils; the pursuance of the county college idea; and a reorientation of the Youth Service towards more constructive training in leisure. Professor Jeffreys goes on to the need for more education of aesthetic and moral feeling (the teacher should be "a real person with positive attitudes, not a mere transmitting medium" (p. 137)); and to the education of thinking, in particular the training of young people in the logic of propaganda. In an epilogue, the relevance of Christianity to all these questions is outlined—it is realistic about human nature; it gives meaning to life and a basis for personal values; it can be a source of power for coping with practical problems; and it provides fellowship and shared experience. Into the whole book Professor Jeffreys weaves a lot of illustrations and sociological observations.

Comment. There is much to agree with in Professor Jeffreys' wide-ranging survey: in particular that the sacredness of the person is the central concept in morality, and one which can be agreed by both Christians and agnostics. Certainly too it is illuminating to think of education in the wide sense as being the main aim of the State; and the recommendations about the teaching and training of young people seem excellent. It is against this background of agreement, then, that the following uneasinesses should be viewed. In Part I, where Professor Jeffreys is giving an account of society, description and value-judgments are (perhaps necessarily) intertwined: and this sometimes leads to bias. Notably, American society gets fairly rough handling: e.g. "There is little or no respect in American life, and little privacy" (p. 48). But the relative egalitarianism (compared with the U.K.) of American society surely enhances respect for persons; and people who live in suburban houses and drive large cars have an awful lot of privacy. (Yet, by the way, what is the joy in English privacy?) Again: "The U.S.A. debauches with coca-cola and comics" (p. 72) seems to me to give a new slant on the evils of drink. *Life*, too, is taken to task for representing homogenised mass-culture: "The same issue may contain an exposition of atomic theory, the story of Rita Hayworth's love-life, photos of starving Korean children, the celebration of Bertrand Russell's birthday and a full-page picture of a roller-skating horse" (p. 73). The last item is admittedly unnerving; but Professor Jeffreys elsewhere stresses the need for communication: so why complain of popular articles on atoms and philosophers?

More serious, though, is the suggestion (p. 82) that the regard for material conveniences and luxuries (materialism in the vulgar sense) can be equated with philosophical materialism. "One danger is that our civilisation may become wholly materialistic . . . it would be quite unjust to accuse the professional scientist of being a materialist or fostering materialistic values. The true scientist is probably much less materialistic —certainly much less mechanistic—than his predecessor of fifty or a hundred years ago." This may lead the reader to think that without something approaching theistic belief, one might as well go in for vulgar materialism. Since the majority of people in this country are likely to be, in the foreseeable future, indifferent to traditional religion, and untouched by philosophical idealism, this would not only be an invalid, but also a dangerous inference for them to draw.

This connects with Professor Jeffreys' view of knowledge. He holds that the difference between branches of knowledge is not essentially one of method but of purpose. So no discipline can claim that any other is invalid; and thus is laid the dragon of scientism. But there is a real danger that this approach can provide the rationale for a highly conservative departmentalisation. For instance, Professor Jeffreys refers to Genesis 1, and how it does not *aim* to be a bit of science. But one can only see that it is not literal cosmology by letting scientific cosmology challenge traditional theology. One of the chief reasons why theology to-day fails so often to be vivaciously convincing is that it does not squarely face the shocks of modern knowledge. It is by no means only in the context of theology that a methodological ceasefire can lead to coma.

A final point. Professor Jeffreys rightly holds that first-degree courses should not be knowledge-stuffing processes (p. 119) and this is one reason why he recommends sandwich courses, to take some of the strain off the first degree. Why be so sure that all, or many, first degrees to-day are knowledge-stuffing ones? In any event, the cure for it, where it exists, lies with us already: namely to teach subjects in such a way that people know how to get conclusions and results on their own. (This is one point of talking about disciplines in terms of their methods.)

These, then, are some disagreements with Professor Jeffreys. But we should be grateful for a wealth of illustration, stimulus and recommendation.

NINIAN SMART

MICHAEL HUTCHINSON AND CHRISTOPHER YOUNG, *Educating the Intelligent* (Penguin Books, 1962, pp. 240. 3s. 6d.).

WHO are "the intelligent"? "No more than the top forty per cent" is our authors' answer, unsupported by evidence or further argument. It is on this kind of assumption that the grub feeds which eats away at the heart of English society and English education.

Mr Hutchinson and Mr Young are thoughtful, liberal-minded men. There is much in their book with which one agrees, much which stirs one to applaud. They insist that more money must be invested in teachers' salaries and in the provision of teaching aids. They make practical suggestions for improving the examination system and university entrance. They seek to look at the secondary school curriculum afresh and to reconcile the needs of the pupil with those of society. They do well to make school architecture an important feature of their book. Their hearts, and to a large extent their minds, are on the side of the angels.

And yet . . . what does all this amount to in the final sum? The changes proposed are detailed improvements rather than fundamental reforms. The authors would make the existing system and its curriculum work more smoothly and efficiently; they do not probe more deeply. For example, the shortage of teachers of mathematics and science in girls' schools is considered, but the arguments for mixed schools, which would go far towards solving this particular problem, are not discussed. Again, their "new-type" curriculum, though an obvious improvement on the old, is essentially the kind of programme which a number of forward-looking grammar school heads have already worked out. To me this is a shortcoming, for I believe that greater changes are needed. On the other hand it will appeal to most grammar school teachers. Our authors are in the van of grammar school reform, far enough ahead to give a stimulating lead, yet not so far ahead as to be thought unrealistic and their ideas therefore unacceptable.

The marks of their limited range of experience which alone, I readily believe, restricts their willingness to consider radical solutions, emerge in various references. For example, they believe that "a measure of competition may have its place in the classroom as being *the only method* (my italics) by which one teacher can stimulate thirty or forty children simultaneously". They would do well to visit the Margaret Tabor School at Braintree. Again, they assert that it is wrong "to suppose that young children are capable of approaching agnosticism. Neither mentally nor emotionally are they ready for such a view of life." Is this true of the pupils of Summerhill and Dartington Hall, or are Mr Hutchinson and Mr Young merely taking for granted a notion which a conservative society does not wish to see challenged? They begin, too, with a set of assertions which will halt the adult tutor and the clergyman in their tracks: "if a child is illiterate when he leaves school . . . he will remain illiterate for the rest of his life." "If a child is amoral when he leaves school . . . he will remain amoral for the rest of his life." The authors do not mean to be pessimistic, only to shake us out of apathy with a terrible warning. One agrees with their aim, but wishes they had chosen a more secure platform from which to launch their attack.

One of the best chapters in the book deals with the school examination system. It argues cogently for an examination which will pass eighty per cent of all candidates rather than G.C.E. O level's present fifty-eight per cent; an examination, too, which will require a pass mark in the region of seventy per cent. "For obvious reasons, when gun-drill is taught in the Royal Navy personnel are not permitted to pass out knowing less than half of what they have been taught." By the same reasoning the banks, for example, need more reassurance than they have now that recruits are not likely to get half their sums wrong. Mr Hutchinson and Mr Young very properly favour substantial control by school teachers of school examinations, just as university teachers control university examinations. This means internal examinations externally assessed. Even here, however, the absence of a more penetrating look at the form that examination (or assessment) should take leaves one with a slight sense of disappointment.

If I seem to have laboured what I regard as shortcomings it is because the book merits serious criticism. Mr Hutchinson and Mr Young have made a valuable contribution to current educational thinking. They do not, however, get down to bedrock. They take for granted a divided secondary education system and the imprecise ideas about "intelligence" which have allowed this system to survive for twenty years. Students would do well, first and foremost, to concentrate closely and analytically on the title of this book, and on the implications which spring from it.

ROBIN PEDLEY

The Foundations of Education, by nine members of the staff of the Department of Education, University of Sydney, and D. A. J. Verco (Cresset Press, London, 1962, pp. 308. 35s.).

THIS book is an introduction to the study of education and is intended for students and teachers. It deals with the development of children, with the school as a society, with ends and means in teaching, and with the factors which make for good teaching and the good teacher.

Unlike many books which are produced by a number of different contributors, this one has obviously been conceived and planned as a whole. It is a fine example of successful team work. Even if (as I trust will not be the case) it were to sell no more than a few dozen library copies, both staff and students of the university education department at Sydney must have profited enormously from the exercise. I feel spurred to suggest that every education department in the universities of this country should follow Sydney's example—even though the typescript may never get as far as the printing press.

The educational philosophy of these teachers is an enlightened one. The liberal influence of Dewey and other American teachers is manifest, but the book is far from giving a one-sided view. Among its most impressive and useful features are the incorporation of up-to-date research, particularly from Australia, America and Britain, and the lists of books and references at the end of each chapter.

It is, perhaps, unfortunate that the student will encounter the more difficult chapters early on, and perhaps be deterred from going on to discover the rich, highly readable chapters towards the end on "motivation, readiness and individual differences", on "the fundamentals of teaching method", and on "group and individual methods". The technical language of psychologists and sociologists is not easily assimilated by the average student and teacher. Specialists ought to ration more carefully the use of such words as "self-actualisation" and "ethnocentrism", phrases like "organismic theory" and "optimisation of gratification". I don't want to knock the book because some of the writers do not share my preference for words of one or two syllables—only to make sure that readers are not put off by the more abstract and theoretical early chapters. These are, in fact, well worth reading. I feel, however, that the order of the chapters, though logical, might with advantage have been rearranged to lead the reader from the easier concepts towards the more difficult ones later on.

The book is very well printed and produced. There is one small error: the diagrams illustrating points (b) and (c) on page 190 have been exchanged.

ROBIN PEDLEY

THELMA VANESS, *School Leavers* (Methuen & Co. Ltd., 1962, pp. 252, 25s.).
KATHLEEN GIBBERD, *No Place like School* (Michael Joseph, 1962, pp. 142, 18s.).
WILLIAM TAYLOR, *The Secondary Modern School* (Faber & Faber, 1963, pp. 254, 32s. 6d.).

As secondary modern schools grow older investigators are able to write more easily about certain of their problems. These three books in their different ways contain the results of detailed research. Thelma Vaness has used the children themselves to tell her what their aspirations and expectations are as they approach school leaving age. She writes that these adolescents became so interested in the inquiry that they "took over, became an end in themselves, so that what a 14 year old said, and surprised us with, became more golden than any critical ratio". This is what makes the book of interest to teachers, for from the answers of the children to inquiries on such subjects as leisure, marriage, religion, schools and education we can obtain quite a different picture from that gathered only from contact in the classroom. Children from modern, grammar and technical schools were included in this survey, and they emerge as lively thinkers, optimistic about the future. Unfortunately, the survey was made early in 1956, when the future did seem rosy. One wonders what differences the recent high unemployment figures and difficulties of finding their first jobs in 1962 would have made to many of the replies. It is a great pity that there is such a time lag between the investigation and the publication. Almost a whole generation of children has passed through the schools during this period. But, nevertheless, the findings do indicate some pointers for teachers now. Children do need more help in preparing for adult life. The work of the Youth Employment Office must be expanded and given more importance, and above all, the child who feels he "hasn't the brains" must be helped more to acquire a greater feeling of confidence. That this is happening in some schools clearly emerges, but it remains one of the greatest problems of the modern school.

No Place like School is a book to be read in an armchair. Its subject matter, always interestingly written, ranges over primary schools, schools for the backward, the modern school and the comprehensive school, and is an attempt to show the difficult job which teachers in these schools are doing. It seems to be a book for the general public and, perhaps because of this, it deteriorates into anecdote and is marred by slight sensationalism; but it gives an accurate account of conditions in many state schools and is critical of many deficiencies in their buildings. The most worthwhile section is that on the primary schools where Miss Gibberd shows clearly the great advance in methods of teaching, and at the same time indicates how ill-judged economies in education can be. It is hoped that many people will read this book, for in being appreciative of the devoted work of teachers Miss Gibberd is underlining the remark of the Minister of Education that teachers are our main defenders against the tide of delinquency.

Whereas Miss Gibberd writes of the introduction of public examinations into secondary modern schools as a mixed blessing Dr W. Taylor takes quite a different view. His book, however, is marred by two factors. It is written for a series entitled "Society Today and Tomorrow" and has become almost a sociological survey. To study schools in relation to the structure of their society is only sensible, but Dr Taylor gives the impression of having begun his study by deciding that the secondary modern schools should be condemned and then using his material to prove this. Secondly, the book is based on work submitted for a Ph.D. thesis, and in many parts it reads like it. Although Dr Taylor asked a friend "to modify the worst excesses of my English style" no great success has been achieved.

The author does, however, examine the secondary modern school in detail. He writes of the problems of the curriculum, teacher training and supply, the transition from school to a job, parity of esteem and the future of these schools. Generally, though he poses problems and sets them in their historical setting he seldom puts forward solutions. For instance, he makes the interesting point that secondary modern schools are the only schools staffed by people who have not been educated in them. This is one of the tragedies of our teacher training system. Because of the excellence of our grammar school sixth forms most principals of teacher training colleges give the impression that they select their entrants only from those who have been in a sixth form. But the modern schools have so improved in their general education during the last ten years that they must have some children who would make admirable teachers.

On the question of public examinations Dr Taylor writes at length. He asserts that the modern schools have begun to prepare their children for these because such examinations as G.C.E. give status, and that in doing this the modern schools show social pressures at work. Rather unfairly he writes that they have given up their general aims so as to do work in connection with examinations and gain success and esteem that way. Because so many modern schools are preparing a few children for the G.C.E. he feels the schools should be done away with. It is not over clear what system he would substitute, but it might be that he has the comprehensive system in mind.

As a result of this feeling Dr Taylor does not look at the cultural life of the schools, of the great impact the real widening of the curriculum has made on children and on their families. Little is written of the artistic and musical life of the school, or of the work of the school as the centre of its community. It may be that events in the modern schools are moving so fast now that studies like Dr Taylor's are out of date as soon as they are published. For it does seem that now the modern school is catering for all its children, its academic, its ordinary, as well as its backward children, the general public is accepting it. Certainly, the criticisms hurled at it in the late forties and early fifties are not now so loudly voiced. Dr Taylor's book will make its readers think seriously about all these implications, including how far politics must control educational thinking.

H. C. HONEYBONE

J. BRIAN BROCKLEHURST, *Music in Schools* (Routledge & Kegan Paul, 18s.).

MUSIC in education is a perennial topic for discussion. Over the past thirty years we have encountered a lively stream of books, pamphlets and reports concerned with the place of music in our schools and colleges. Some, predominantly pedagogic, have put forward detailed schemes for the teacher to follow. Others, more philosophic, have urged us "... *to look* ahead beyond the immediate horizon of the classroom".

To survey the trends of more than a quarter of a century of music-teaching, and, at the same time, to give an overall picture of music as it is found in our schools to-day, would seem a formidable task. Yet this Dr Brocklehurst has accomplished in his admirable handbook *Music in Schools*. Here is a work of reference that every specialist teacher will want to possess. It is also eminently readable, thought-provoking and stimulating. Dr Brocklehurst's approach is first and foremost that of a practical musician, but the text throughout is enriched and enlivened by his scholarship and width of vision.

Of the ten sections listed, that on the teaching of singing in schools will probably be of the greatest immediate benefit to the young teacher, confronted, as he or she so often is, with seemingly insoluble problems. Ample advice that every beginner will welcome is proffered, together with useful information on a variety of topics, from choice of songs to the production of an opera.

In the field of instrumental playing, there have been noteworthy developments over the past few years and the section devoted to this aspect of school music is suitably comprehensive. The potential value of such melodic instruments as glockenspiels, harmonicas or chime-bars, percussion bands, school orchestras, recorder, violin and piano classes—all these are ably discussed. "Children should be provided with as wide a range of musical experiences as possible and be given the opportunity to discover for which branches of the art of music they have the most aptitude."

The importance of musicianship is rightly stressed and all educationists would subscribe to a greater need for continuity in teaching—particularly between the junior and secondary levels—though some methods considered here might engender controversy. Few, however, would dispute an entirely salutary approach to musical appreciation viewed as "the ultimate aim of all branches of school music". The need to lay foundations of good taste from earliest years is clearly emphasised. "It by no means follows that if a person has a taste for music he also has a taste in music, and it is important that, as teachers of music, we should not only inculcate a love of music but also give attention to developing the children's musical taste and powers of discrimination; Calvocoressi rightly declares that taste is essentially "the power to enjoy coupled with the power to discriminate."

For the rest, there are useful comments on music and movement, jazz and the adolescent, music for handicapped children and a short section devoted to tests of musical ability. There is also a survey of equipment and accommodation that would be of marked value when planning a music-room, while throughout the text we find numerous references to books, music, recordings and visual aids available for the teacher of to-day. Not least is a bibliography in the form of suggestions for further readings.

All in all, this little book is a masterpiece of compression. Practical, scholarly and informative, it should be given a place in the library of every training college and university department of education.

D. H. Owen

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